

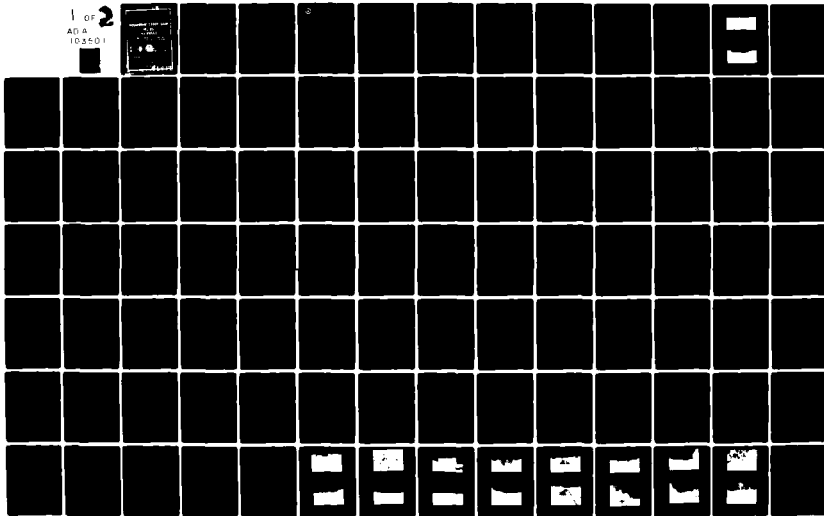
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NEW JERSEY DEPT OF ENVIRONMENTAL PROTECTION TRENTON --ETC F/G 13/13
NATIONAL DAM SAFETY PROGRAM, ASSUNPINK CREEK DAM NUMBER 20 (NJ0--ETC(U)
AUG 81 J J WILLIAMS DACW61-79-C-0011

UNCLASSIFIED

DAEN/NAP-53842/NJ00552-81/ NL

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DELAWARE RIVER BASIN
ASSUNPINK CREEK MERCER COUNTY
NEW JERSEY

ASSUNPINK CREEK DAM

NO. 20

NJ 00552

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

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SECURITY CLASSIFICATION OF THIS PAGE

National Dam Safety Program. Assunpink
Creek Dam Number 20 (NJ00552), Delaware
River Basin, Assunpink Creek, Mercer
County, New Jersey. Phase I Inspection
Report.

REPORT DOCUMENT		DUCTIONS ETING FORM OG NUMBER
1. REPORT NUMBER DAEN/NAP-53842/NJ00552-81/08		HD-4103-501
4. TITLE (and Subtitle) Phase I Inspection Report National Dam Safety Program Assunpink Creek Dam, NJ00552 Mercer County, N.J.		5. TYPE OF REPORT & PERIOD COVERED FINAL
7. AUTHOR(s) Williams, John J., P.E.		6. PERFORMING ORG. REPORT NUMBER DACW61-79-C-0011 ✓
9. PERFORMING ORGANIZATION NAME AND ADDRESS O'Brien & Gere Engineers Inc. Suite 1760 1617 J.P. Kennedy Blvd. Philadelphia, PA 19103		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS NJ Department of Environmental Protection Division of Water Resources P.O. Box CNO29 Trenton, NJ 08625		12. REPORT DATE August, 1981
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) U.S. Army Engineer District, Philadelphia Custom House, 2d & Chestnut Streets Philadelphia, PA 19106		13. NUMBER OF PAGES 50
		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES Copies are obtainable from National Technical Information Service, Springfield, Virginia 22151.		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Dams Embankments Visual Inspection Structural Analysis National Dam Safety Program Assunpink Creek Dam, N.J. Seepage		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report.		

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DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE-2 D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

Honorable Brendan T. Byrne
Governor of New Jersey
Trenton, New Jersey 08621

13 AUG 1981

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Justification	
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Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Assunpink Creek Dam No. 20 in Mercer County, New Jersey which has been prepared under authorization of the Dam Inspection Act, Public Law 92-367. A brief assessment of the dam's condition is given in the front of the report.

Based on visual inspection, available records, calculations and past operational performance, Assunpink Creek Dam No. 20, initially listed as a high hazard potential structure but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in good overall condition and the spillway is considered adequate. To ensure the adequacy of the structure, the following remedial actions are recommended:

a. Within one year from the date of approval of this report the owner should engage a qualified professional consultant to perform the following:

(1) Investigate the cause of the voids at the junction of the upstream grouted riprap apron of both the principal and auxiliary drop spillways. Supervise filling of the voids with suitable material.

(2) Check the downstream toe of the dam for seepage after the impoundment has been filled.

b. Within one year from the date of approval of this report the following remedial actions should be initiated:

(1) The ruts on the crest of the dam should be backfilled with suitable compacted material.

(2) An appropriate vegetative cover should be re-established where necessary on the crest of the dam.

(3) Measures should be taken to keep unauthorized vehicular traffic off of the dam.

NAPEN-N

Honorable Brendan T. Byrne

c. The owner should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam, within one year from the date of approval of this report.

d. An emergency action plan and warning system should be developed which outlines actions to be taken by the owner to minimize the downstream effects of an emergency at the dam within six months from the date of approval of this report.

A copy of the report is being furnished to Mr. Dirk C. Hofman, New Jersey Department of Environmental Protection, the designated State Office contact for this program. Within five days of the date of this letter, a copy will also be sent to Congressman Smith of the Fourth District. Under the provision of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, five days after the date of this letter.

Additional copies of this report may be obtained from the National Technical Information Services (NTIS), Springfield, Virginia 22161 at a reasonable cost. Please allow four to six weeks from the date of this letter for NTIS to have copies of the report available.

An important aspect of the Dam Inspection Program will be the implementation of the recommendations made as a result of the inspection. We accordingly request that we be advised of proposed actions taken by the State to implement our recommendations.

Sincerely,



ROGER L. BALDWIN

Lieutenant Colonel, Corps of Engineers
Commander and District Engineer

1 Incl
As stated

Copies furnished:

Mr. Dirk C. Hofman, P.E., Deputy Director
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

Mr. John O'Dowd, Acting Chief
Bureau of Flood Plain Regulation
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

ASSUNPINK CREEK DAM NO. 20 (NJ00552)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 6 May 1981 by O'Brien & Gere Engineers, Inc. under contract to the U.S. Army Engineer District, Philadelphia, in accordance with the National Dam Inspection Act, Public Law 92-367.

Assunpink Creek Dam No. 20, initially listed as a high hazard potential structure but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in good overall condition and the spillway is considered adequate. To ensure the adequacy of the structure the following remedial actions are recommended:

a. Within one year from the date of approval of this report the owner should engage a qualified professional consultant to perform the following:

(1) Investigate the cause of the voids at the junction of the upstream grouted riprap apron of both the principal and auxiliary drop spillways. Supervise filling of the voids with suitable material.

(2) Check the downstream toe of the dam for seepage after the impoundment has been filled.

b. Within one year from the date of approval of this report the following remedial actions should be initiated:

(1) The ruts on the crest of the dam should be backfilled with suitable compacted material.

(2) An appropriate vegetative cover should be re-established where necessary on the crest of the dam.

(3) Measures should be taken to keep unauthorized vehicular traffic off of the dam.

c. The owner should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam, within one year from the date of approval of this report.

d. An emergency action plan and warning system should be developed which outlines actions to be taken by the owner to minimize the downstream effects of an emergency at the dam within six months from the date of approval of this report.

APPROVED:



ROGER L. BALDWIN

Lieutenant Colonel, Corps of Engineers
Commander and District Engineer

DATE:

13 Aug 81

DELLAWARE RIVER BASIN

Name of Dam: Assunpink Creek Dam No. 20
County and State: Mercer County, New Jersey
Inventory Number: NJ 00552

PHASE I INSPECTION PROGRAM
NATIONAL DAM SAFETY PROGRAM

Prepared by:

O'BRIEN & GERE ENGINEERS, INC.

For

DEPARTMENT OF THE ARMY
Philadelphia District, Corps of Engineers
Custom House-2nd & Chestnut Streets
Philadelphia, PA 19106

AUGUST 1981

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I REPORT

NATIONAL DAM INSPECTION PROGRAM

Name of Dam:	Assunpink Creek Dam No. 20
	ID # NJ 00552
State Located:	New Jersey
County Located:	Mercer
Stream:	Assunpink Creek
Coordinates:	Latitude N 40°16.0', Longitude W 74°39.8'
Date of Inspection:	May 6, 1981

ASSESSMENT

Based on visual observations made during the inspection, information provided by the New Jersey Department of Environmental Protection (NJDEP), the Soil Conservation Service (SCS), the Mercer County Parks Commission (MCPC), the Owners and conversations with the representatives of SCS and MCPC, Assunpink Creek Dam No 20 is considered to be in overall good condition. The dam provides flood control and provides an impoundment for recreation.

The dam is a zoned earth embankment approximately 3,830 feet long with a maximum height of about 26 feet. The width of the crest of the dam is 15 feet and both the upstream and downstream slopes are 3H:1V.

The spillway is a three stage system. The low stage principal spillway consists of a 4-foot wide by 12-foot long and 11.5 foot high reinforced concrete intake riser which outlets into a 4-foot diameter, 81.5 foot long prestressed reinforced concrete pipe. The principal spillway pipe outlets through the headwall of the intermediate stage principal drop spillway.

The intermediate stage reinforced concrete principal drop spillway is 90 feet long, 17.5 feet high with a 48.5 foot-long discharge apron and a three foot high end sill at the downstream end of the apron. The high stage reinforced concrete auxiliary drop spillway is 250 feet long, 19.5 feet high with a 38.5-foot long discharge apron and a 2.25-foot high end sill at the downstream end of the apron.

A stilling basin of approximately four acres is located immediately downstream of the principal and auxiliary drop spillways. The stilling basin outlets into the natural channel of Assunpink Creek about 500 feet downstream of the spillways.

Voids of up to one foot across have developed at the junction of the upstream grouted riprap apron of both the principal and auxiliary drop spillways and the embankment.

The crest of the dam has many reaches of bare earth with ruts up to 0.5 feet deep which are apparently the result of unauthorized vehicular traffic.

Because the headwater and tailwater are presently at the same level, any tendency for seepage through the embankment would not be apparent at this time.

One house is located about 200 feet left of the Assunpink Creek channel bank approximately 0.5 miles downstream of the dam. The lowest door sill in the house is about 10 feet above the normal stream surface. A second potential damage site is an industrial building approximately 1.5 miles downstream of the dam. The low door sill in this building is about eight feet above the normal stream surface. A failure of the dam could result in appreciable property damage and the possible loss of a few lives. Therefore, Assunpink Creek Dam No. 20 is classified in the "Significant" hazard potential category.

The selected Spillway Design Flood (SDF) for this "Intermediate" size, "Significant" hazard dam is one-half of the Probable Maximum Flood (PMF). The spillway system is capable of discharging 100 percent of the SDF with approximately 6.1 feet of freeboard. Therefore, the spillway system is classified as "Adequate".

The Owner should retain the services of a licensed professional engineer experienced in the design and construction of dams to assist in complying with the following recommendations and remedial measures.

The recommendations and remedial measures which should be initiated in the near future are as follows:

a. Facilities

1. The cause of the voids at the junction of the upstream grouted riprap apron of both the principal and auxiliary drop spillways should be investigated and the voids should be filled with suitable material.

2. The ruts on the crest of the dam should be backfilled with suitable compacted material.

3. An appropriate vegetative cover should be re-established where necessary on the crest of the dam.

4. Measures should be taken to keep unauthorized vehicular traffic off of the dam.

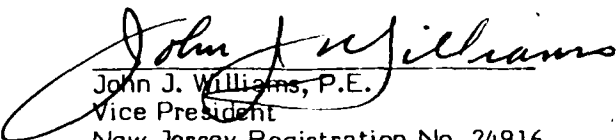
5. The downstream toe of the dam should be checked for seepage after the impoundment has been filled.

b. Operation and Maintenance Procedures

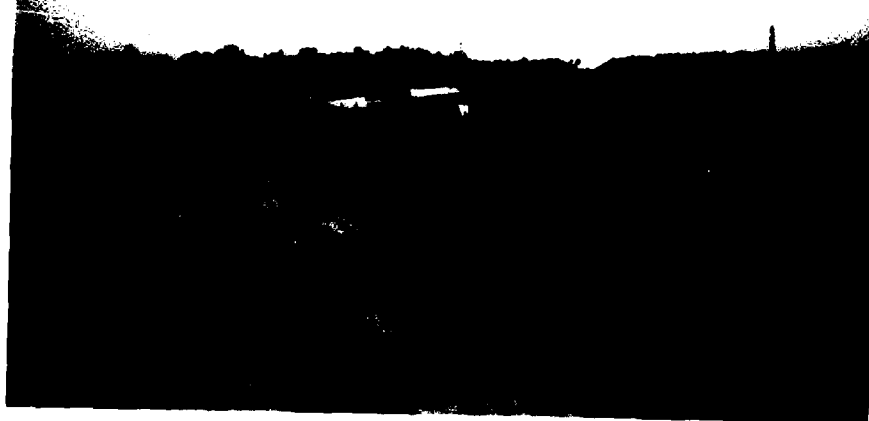
1. The Owner should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam.

2. An emergency action plan should be developed which outlines actions to be taken by the Owner to minimize the downstream effects of an emergency. This plan should include an effective warning system.

O'BRIEN & GERE ENGINEERS, INC.


John J. Williams, P.E.
Vice President
New Jersey Registration No. 24916

Date: 28 July 1981



UPSTREAM OVERVIEW AS OBSERVED FROM ABOUT 1,000 FEET FROM THE LEFT ABUTMENT. (5/6/81)



DOWNSTREAM OVERVIEW AS OBSERVED FROM ABOUT 100 FEET LEFT OF THE SPILLWAY. (5/6/81)

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PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
ASSUNPINK CREEK DAM NO. 20
INVENTORY NUMBER - NJ 00552

SECTION 1

PROJECT INFORMATION

1.1 General

a. Authority. This report is authorized by the Dam Inspection Act, Public Law 92-367, and has been prepared in accordance with Contract # DACW 61-80-D-0013 between O'Brien & Gere Engineers, Inc. and the United States Army Corps of Engineers, Philadelphia District.

b. Purpose of Inspection. The purpose of this inspection is to evaluate the structural and hydraulic condition of Assunpink Creek Dam No. 20 and appurtenant structures and to determine if the dam constitutes a hazard to human life or property.

1.2 Project Description (Based on information provided by the New Jersey Department of Environmental Protection (NJDEP), U.S. Department of Agriculture, Soil Conservation Service (SCS), Mercer County Park Commission (MCPC), and supplemented by field observations).

a. Description of Dam and Appurtenances. Assunpink Creek Dam No. 20 is a zoned compacted earth embankment with a zoned compacted earth cutoff. The dam is approximately 3,830 feet in length with a maximum height of about 26 feet. The width of the crest of the dam is 15 feet and both the upstream and downstream slopes are 3H:1V.

The spillway is a three stage system. The low stage principal spillway consists of a four-foot wide by 12-foot long and 11.5-foot high reinforced concrete intake riser which outlets into a four-foot diameter 81.5-foot long prestressed reinforced concrete pipe. The principal spillway pipe outlets through the headwall of the intermediate stage principal drop spillway.

The intermediate stage reinforced concrete principal drop spillway is 90 feet long, 17.5 feet high with a 48.5-foot long discharge apron and a 3.0-foot high end sill at the downstream end of the apron. The high stage reinforced concrete auxiliary drop spillway is 250 feet long, 19.5 feet high with a 38.5-foot long discharge apron and a 2.25-foot high end sill at the downstream end of the apron.

A stilling basin of approximately four acres is located immediately downstream of the principal and auxiliary drop spillways. The stilling basin outlets into the natural channel of Assunpink Creek about 500 feet downstream of the spillways.

b. Location. Assunpink Creek Dam No. 20 is located on Assunpink Creek approximately 0.5 miles upstream of Quaker Bridge Road in West Windsor Township, New Jersey. The site is shown on the USGS Quadrangle entitled "Princeton, N.J." at coordinates N 40° 16.0', W 74° 39.8'. A regional location map of Assunpink Creek Dam No. 20 is included as Figure 1 in Appendix E.

c. Size Classification. Assunpink Creek Dam No. 20 has a maximum height of approximately 26 feet which places it in the "Small" size dam category since it is less than 40 feet high. The maximum storage capacity of 14,730 acre-feet fall within the "Intermediate" size classification (greater than 1,000 acre-feet and less than 50,000 acre-feet). Assunpink Creek Dam No. 20 is therefore classified as an "Intermediate" size structure.

d. Hazard Classification. One house is located about 200 feet left of the Assunpink Creek channel bank approximately 0.5 miles downstream of the dam. The lowest door sill in the house is about 10 feet above the normal stream surface. A second potential damage site is an industrial building approximately 1.5 miles downstream of the dam. The low door sill in this building is about eight feet above the normal stream surface. A failure of the dam could result in appreciable property damage and the possible loss of a few lives. Therefore, Assunpink Creek Dam No. 20 is classified in the "Significant" hazard potential category.

e. Ownership. Assunpink Creek Dam No. 20 is owned by the Mercer County, New Jersey Park Commission. Edward Lisiecki, Executive Secretary, may be contacted at P.O. Box 8068, 640 S. Broad Street, Trenton, NJ 08650, telephone: 609-989-6530.

f. Purpose of Dam. The dam provides flood control and when the gates on the principal spillway riser are closed it will also provide a 275 acre impoundment for recreation.

g. Design and Construction History. The dam was originally designed from 1973 through 1975 by the SCS. Construction began in 1976, but due to design modifications construction was delayed for approximately one year beginning in July 1977. Following the completion of the design modifications in March 1978, construction was resumed in 1978. All construction was completed in October 1979.

According to the Owner's representative, Edward Lisiecki, the three gates on the riser of the principal spillway will be closed when construction is completed on Assunpink Creek Dam No. 6, about 5.5 miles upstream and when the recreation facilities on Site 20 are completed below normal pool Elevation 64.0. Construction on Site 6 is scheduled to be completed this summer. Site 20 presently functions as a single purpose flood retarding structure.

h. Normal Operating Procedures. Assunpink Creek Dam No. 20 will have a normal pool of approximately 2,700 acre-feet with the water surface at about Elevation 64.0. Normal pool will be maintained at Elevation 64.0 by keeping the three gates (two, two-foot high by four-foot long gates with invert elevations of 57.8 and one 4-foot diameter gate with an invert elevation of 53.5) on the principal spillway riser closed. According to the Owner's representative, one of the two-foot

high by four-foot long gates will probably be opened during the winter months to lower the impoundment to facilitate feeding the stocked fish. If additional flood storage were required or to augment downstream discharges, the gates on the riser could be adjusted accordingly.

1.3 Pertinent Data

a. <u>Drainage Area.</u> (Square Miles)	33.0
b. <u>Discharge at Dam Site.</u> (CFS)	
Principal Spillway capacity Elevation 66.5	228
Principal Spillway plus Principal Drop	1,490
Spillway Elevation 69.25 Crest Auxiliary Drop Spillway	
Principal Spillway, Principal Drop Spillway	27,000
and Auxiliary Drop Spillway, Elevation 78.0 Top of Dam	
c. <u>Elevations.</u> (Feet above MSL)	
Top of Dam (Low point, design top of dam)	78.00
Auxiliary Drop Spillway Crest	69.25
Principal Drop Spillway Crest	66.50
Principal Spillway Riser Crest	64.00
Stilling Basin Floor	52.00
d. <u>Reservoir Length.</u> (Miles)	
Normal Pool	2.8
Crest of Principal Drop Spillway	2.9
Crest of Auxiliary Drop Spillway	3.0
Top of Dam	5.5
e. <u>Storage.</u> (Acre-Feet)	
Normal Pool	2,700
Crest of Principal Drop Spillway	3,410
Crest of Auxiliary Drop Spillway	4,830
Top of Dam	14,730
f. <u>Reservoir Surface Area.</u> (Acres)	
Normal Pool	275
Crest of Principal Drop Spillway	450
Crest of Auxiliary Drop Spillway	680
Top of Dam	1,630
g. <u>Dam Data.</u>	
Type	Zoned compacted earth embankment
Length	3,830 Feet (including spillway)

Height	26 feet
Top Width	15 feet
Side Slopes	3H:1V Both upstream and downstream
Zoning	7 Zones, refer to drawings in Appendix E
Impervious Core	Silts and clayey silts, refer to drawings in Appendix E
Cutoff	2 Zones, refer to drawings in Appendix E
Grout Curtain	None

h. Spillways

1. Principal Spillway

Type	Reinforced Concrete Drop Inlet Closed Conduit
Weir Length	24 feet
Crest Elevation	64.0
Gates	Two, two-foot high by four-foot long at Elevation 57.8 and one, four-foot diameter with invert Elevation 53.5
Upstream Channel	Impoundment of Assunpink Creek Dam, No. 20
Downstream Channel	Apron of Principal Drop Spillway which outlets into Stilling Basin which outlets into Assunpink Creek

2. Principal Drop Spillway

Type	Reinforced Concrete Drop Spillway
Weir Length	90 feet
Crest Elevation	66.50
Gates	No gates; however, outlet for four-foot diameter reservoir drain gate passed through headwall.
Upstream Channel	Impoundment of Assunpink Creek Dam, No. 20
Downstream Channel	Stilling Basin which discharges into Assunpink Creek

3. Auxiliary Drop Spillway

Type	Reinforced Concrete Drop Spillway
Weir Length	250.0 feet
Gates	None
Upstream Channel	Impoundment of Assunpink Creek Dam, No. 20
Downstream Channel	Stilling Basin which discharges into Assunpink Creek

- i. Outlet Works. The outlet works consist of a four-foot diameter gate on the upstream end wall of the principal spillway riser. The invert of the gate is at Elevation 53.5. The operator for the gate is mounted on the top slab of the riser.

SECTION 2

ENGINEERING DATA

2.1 Design

a. Data Available. Information available from the Soil Conservation Service (SCS) includes the following:

1. Complete set of construction drawings.
2. Complete design report which includes survey data, hydraulics and hydrology design, geology report, soil mechanics laboratory report, structural design, quantity computations and specifications.

Information available from the New Jersey Department of Environmental Protection (NJDEP) includes the following:

1. Application for Permit for Construction of Dam.
2. Dam Application Permit, No. 641
3. Report on Dam Application.
4. Construction Inspection Report.
5. General Correspondence

b. Design Features. The principal design features for this structure are discussed in Section 1.2.a and shown on the drawings enclosed in Appendix E.

2.2 Construction.

Construction was started in 1976, but due to design modifications, construction was delayed for approximately one year beginning in July 1977. Following the completion of the design modifications in March 1978, construction was resumed for the 1978 season. All construction was completed in October, 1979.

A construction inspection report dated May 1977 is available from NJDEP. The complete construction diary and periodic construction inspection reports are available from SCS.

2.3 Operation

Operation to date has consisted of leaving the two, two-foot high by four-foot long gates with invert elevations of 57.8 and the one, four-foot diameter gates with an invert elevation of 53.5 in the fully open position. All three gates are located on the principal spillway riser. When the recreation development construction up to Elevation 64.0 at Site 20 is completed and the construction on Assunpink Creek

Dam, No. 6, 5.5 miles upstream of Site 20 is completed, all three gates will be kept in the closed position under normal operating condition. According to the Owner's representative, one of the 2-foot high by 4-foot long gates will probably be opened during the winter months to lower the impoundment to facilitate feeding of the stocked fish. In the future, the gates could also be operated if needed or if additional flood storage were required.

2.4 Evaluation

a. Availability. Information provided by the NJDEP, SCS and the Mercer Co. Park Commission (MCPC) was used in the preparation of this report. All of the original design and construction data is available from SCS.

b. Adequacy. The information available from NJDEP and SCS, conversations with Edward Lisiecki, Executive Secretary, Mercer County Parks and William Heffernam, SCS, Assunpink Creek Watershed Project Engineer and observations made during the field investigation provided adequate data for a Phase I evaluation.

c. Validity. There appears to be no reason to question the validity of the data provided by NJDEP, SCS, the Mercer County Parks Commission representative and the SCS Assunpink Creek Watershed Project Engineer.

SECTION 3

VISUAL INSPECTION

3.1 Findings

a. General. The field inspection of Assunpink Creek Dam No. 20 took place on May 6 and June 3, 1981. The observations and comments of the field inspection team are presented in Appendix B of this report. At the time of the inspection, the water surface in the impoundment was at approximately Elevation 55.5 which is about 8.5 feet below normal pool. This was also the tailwater level at the time of inspection. The four-foot diameter reservoir drain gate (invert Elev. 53.5) was in the fully open position and, according to the Owner's representative, it will remain fully open until the recreation facilities are completed at Site 20 to Elevation 64.0 and construction is completed at Site 6, 5.5 miles upstream. The overall appearance of the site is good.

b. Dam. Assunpink Creek Dam No. 20 is a zoned compacted earth embankment which appears to be in good condition. Both the upstream and downstream faces of the dam have good grass cover. The crest of the dam, however, has many reaches of bare earth with ruts up to 0.5 feet deep which are apparently the result of unauthorized vehicular traffic.

Riprap located on the upstream face of the embankment in the vicinity of the normal pool appears to be well graded and of good quality. Grouted riprap located immediately upstream of both the principal drop spillway and the auxiliary drop spillway also appears to be in good condition except for a few voids up to one foot across at the interface with the embankment.

Because the headwater and tailwater are presently at the same level, any tendency for seepage through the embankment would not be apparent at this time. The downstream toe of the embankment should be inspected after the impoundment has been filled to the normal pool level.

c. Appurtenant Structures. The reinforced concrete spillway system, which consists of the low stage principal spillway (riser crest Elevation 64.0), the intermediate stage principal drop spillway (weir crest Elevation 66.5) and the high stage auxiliary drop spillway (weir crest Elevation 69.25), appears to be in good condition.

The concrete of the low stage principal spillway intake riser appears to be in good condition. The aluminum angles and gratings of the trash racks are located in accordance with the drawings and are in excellent condition. All three gates and their operators (two, two-foot high by four-foot wide with inverts at Elevation 57.8 and one, four-foot diameter with its invert at Elevation 53.5) are new and fully operational. Refer to pictures 4 through 7 in Appendix D for complete coverage of the riser. The prestressed reinforced concrete four-foot diameter conduit of the low stage principal spillway system could not be observed during the inspection because discharge was flowing through it at a depth of about two feet.

The portion of the reinforced concrete of the intermediate stage principal spillway and the high stage auxiliary drop spillway which was visible during the inspection also appears to be in good condition. The horizontal alignment of the headwall varies by an inch or two. It appears that this variance is a result of form placement during construction. Refer to pictures 9, 10, and 11 of Appendix D.

d. Reservoir Area. The entire permanent pool area has been cleared and grubbed. The slopes along the perimeter of the reservoir are for the most part very flat (one to two percent). In a few areas the slopes are as steep as 20 percent. According to the Owner's representative, the permanent pool will remain about 8.5 feet below normal pool level Elevation 64.0 until the recreation development has been completed at Site 20 to Elevation 64.0 and the construction has been completed at Site 6. The entire perimeter of what will be the permanent pool is grass covered with several clusters of trees.

e. Downstream Channel. The downstream channel beyond the stilling basin is Assunpink Creek which flows through wooded and open meadow areas for about three miles before discharging into Whitehead Mill Pond. The creek flows under three highway bridges and the Conrail-Amtrak Railroad mainline bridge in this three mile reach. Fallen trees, branches, etc. form obstructions at several locations.

The average slope of the invert of the creek is about 0.1 percent. The channel banks vary between 1H:1V to 2H:1V.

One house and one industrial building are located in the vicinity of the creek between Site 20 and Whitehead Mill Pond.

SECTION 4

OPERATIONAL PROCEDURES

4.1 Procedures

According to the Owner's representative, Edward Lisiecki, the two, two-foot high by four-foot wide gates with inverts at Elevation 57.8 and the one, four-foot diameter gate with its invert at Elevation 53.5 which are mounted in the low stage principal spillway intake riser will be kept closed once the recreation development below Elevation 64.0 (Normal Pool) has been completed at Assunpink Site 20 and construction has been completed at Assunpink Site 6. After the gates are closed, one of the two-foot high by four-foot wide gates will probably be opened during the winter months to lower the impoundment and facilitate feeding the stocked fish. At present, all three gates are fully opened.

4.2 Maintenance of the Dam

According to the Owner's representative, James Haggerty, General Superintendent of Mercer County Parks, who is responsible for maintenance of the Mercer County Parks, no written maintenance program presently exists for Site 20. A written maintenance program is planned to be developed and implemented in the near future.

Maintenance of the site appears to be good except for ruts up to six inches deep on the crest of the dam resulting from unauthorized vehicular traffic and voids up to one foot wide at the interface of the grouted riprap approach apron of the drop spillways with the embankment.

4.3 Maintenance of Operating Facilities

According to the Owner's representative, James Haggerty, the operating facilities, which consist of the three gates on the low stage principal spillway intake riser are periodically checked by Mercer County park personnel. All three gates appear to be in good condition.

4.4 Description of Any Warning Systems in Effect

According to the Owner's representative, no written warning system presently exists for Site 20. A written warning system is planned to be developed in the near future.

4.5 Evaluation of Operational Adequacy

A regular inspection and maintenance program should be developed and implemented by the Owner.

A downstream warning system should be developed. The dam should be monitored during periods of heavy rainfall and downstream residents and highway authorities should be alerted in the event of impending failure.

SECTION 5

HYDRAULICS AND HYDROLOGY

5.1 Evaluation of Features

a. Design Data SCS provided their entire hydraulics and hydrology design data to assist in the preparation of this report. Assunpink Creek Dam No. 20 has a drainage area of 33.0 square miles and the spillway system has a discharge capacity with the impoundment at the crest of dam Elevation 78.0 of approximately 27,000 cfs. Elevations within the watershed vary from a maximum of about Elevation 330 near Roosevelt, NJ to Elevation 64.0 at normal pool. The basin has a maximum length of about 15 miles and a maximum width of approximately 3.5 miles. The drainage area is essentially suburban developments towards the western end of the basin while the balance of the basin is mostly farms and woodlots. Three small towns, Edinburg, Windsor and Roosevelt are located in the watershed. The New Jersey Turnpike and several other major roads pass through the basin.

b. Experience Data. A USGS gaging station is located on Assunpink Creek about 2,000 feet downstream of Site 20. Spillway discharge records have not been kept because the gates on the low stage principal spillway intake riser have not been closed since the dam was completed in October 1979. With the impoundment level at normal pool, Elevation 64.0, it would take approximately 20 days to draw the reservoir down about 8.5 feet to Elevation 55.5. This is essentially the level of the water in the impoundment with the four-foot diameter reservoir drain gate fully open with base flow discharging through the site.

c. Visual Observations. On the date of the inspection, the trash racks of the low stage principal spillway intake riser were completely free of trash. The approaches to the intermediate stage principal drop spillway and the high stage auxiliary drop spillway were also completely free of obstructions. The drop spillway aprons and the stilling basin were obstruction free.

d. Overtopping Potential. The recommended Spillway Design Flood (SDF) range for an "Intermediate" size, "Significant" hazard dam is from one-half of the Probable Maximum Flood (PMF) to the full PMF. The initial potential damage area downstream of Assunpink, Site 20 consist of one house about 200 feet left of the Assunpink Creek channel bank approximately 0.5 miles downstream of the dam. The lowest door sill in the house is about 10 feet above the normal stream surface. A second potential damage site is an industrial building approximately 1.5 miles downstream of the dam. The low door sill in this building is about 8 feet above the normal stream surface. A failure of the dam could result in appreciable property damage and the possible loss of a few lives. Considering the above, the selected SDF is one half of the PMF.

The SDF hydrograph was routed through the reservoir with the initial water surface elevation at the crest of the low stage principal spillway intake riser, Elevation 64.0. The peak inflow and outflow rates for the SDF were computed to be about 10,510 cfs and 6,530 cfs, respectively. The spillway is capable of discharging 100 percent of the SDF.

e. Spillway Adequacy. The spillway is considered to be "Adequate" because it is capable of discharging the SDF.

SECTION 6

STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations. Overall, the dam appeared to be in good condition at the time of the inspection. Both the upstream and downstream slopes of the dam have good grass cover. Many reaches of the crest of the dam; however, are bare and rutted as a result of unauthorized vehicular traffic. The riprap placed on the upstream slope of the dam to protect against wave action in the vicinity of the normal pool appears to be well graded and of good quality. Grouted riprap located immediately upstream of both the principal drop spillway and the auxiliary drop spillway also appears to be in good condition except for a few voids up to one foot across at the interface with the embankment.

Because the headwater and tailwater are presently at the same level, any tendency for seepage through the embankment would not be apparent at this time. The downstream toe of the embankment should be inspected after the impoundment has been filled to the normal pool level.

The reinforced concrete spillway system, which consists of the low stage principal spillway (riser crest Elevation 64.0), the intermediate stage principal drop spillway (weir crest Elevation 66.5) and the high stage auxiliary drop spillway (weir crest Elevation 69.25), appeared to be stable and in overall very good condition.

b. Design and Construction Data. The complete design report, the complete set of construction drawings, the complete construction diary and periodic construction inspection reports are available from SCS.

c. Operating Records. Since the reservoir has not been filled since construction was completed in October 1979, no operating records have been kept.

d. Post Construction Changes. Since the dam was completed in October 1979, no post construction changes have been made.

e. Seismic Stability. Assunpink Creek Dam No. 20 is located in Seismic Zone 1 on the Seismic Zone Map of Contiguous States. A dam located in Seismic Zone 1 is generally considered to be safe under any expected Zone 1 earthquake loading conditions if it is stable under static loading conditions.

SECTION 7

ASSESSMENT RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

a. Evaluation. Based on visual observations made during the field inspections, the dam and appurtenances appear to be in good condition.

Voids of up to one foot across have developed at the junction of the upstream grouted riprap apron of both the principal and auxiliary drop spillways and the embankment.

The crest of the dam has many reaches of bare earth with ruts up to 0.5 feet deep which are apparently the result of unauthorized vehicular traffic.

Because the headwater and tailwater are presently at the same level, any tendency for seepage through the embankment was not apparent at the time of the inspection.

The selected Spillway Design Flood (SDF) for Assunpink Creek Dam No. 20 is one-half of the Probable Maximum Flood (PMF). The spillway system is capable of discharging 100 percent of the SDF. Therefore, the spillway system is classified as "Adequate".

b. Adequacy of Information. The information available from NJDEP and SCS, conversations with Edward Lisiecki, Executive Secretary, Mercer County Parks and William Heffernam, SCS, Assunpink Creek Watershed Project Engineer and observations made during the field investigation provided adequate data for a Phase I evaluation.

c. Urgency. The remedial measures recommended in Section 7.2 should be implemented in the near future.

d. Necessity for Further Investigation. None required.

The Owner should retain the services of a licensed professional engineer experienced in the design and construction of dams to assist in complying with the following recommendations and remedial measures.

The recommendations and remedial measures which should be initiated in the near future are as follows:

7.2 Recommendations and Proposed Remedial Measures

a. Facilities

1. The cause of the voids at the junction of the upstream grouted riprap apron of both the principal and auxiliary drop spillways should be investigated and the voids should be filled with suitable material.

2. The ruts on the crest of the dam should be backfilled with suitable compacted material.

3. An appropriate vegetative cover should be re-established where necessary on the crest of the dam.

4. Measures should be taken to keep unauthorized vehicular traffic off of the dam.

5. The downstream toe of the dam should be checked for seepage after the impoundment has been filled.

b. Operation and Maintenance Procedures

1. The Owner should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam.

2. An emergency action plan should be developed which outlines actions to be taken by the Owner to minimize the downstream effects of an emergency. This plan should include an effective warning system.

APPENDIX

A

Check List Engineering Data
Design, Construction, Operation
Phase I

CHECK LIST ENGINEERING DATA DESIGN, CONSTRUCTION, OPERATION PHASE I	NAME OF DAM	Assumpink Creek
	ID #	NJ 00552
		Dam No. 20

Sheet 1 of 4

ITEM

REMARKS

AS-BUILT DRAWINGS

Complete as built drawings for the original design and for the revised design are available from the Soil Conservation Service (SCS). Also refer to Appendix E.

REGIONAL VICINITY MAP

Refer to Appendix E, Figure 1, Page 1.

CONSTRUCTION HISTORY

Construction related to the dam was commenced in 1976. The dam was completed in October 1979.

TYPICAL SECTIONS OF DAM

Refer to Appendix E.

OUTLETS - PLAIN

DETAILS

CONSTRAINTS

Refer to Appendix E.

DISCHARGE RATINGS

Available from SCS

RAINFALL/RESERVOIR RECORDS

Available from SCS

ITEM	REMARKS
DESIGN REPORTS	Complete design report is available from SCS.
GEOLOGY REPORTS	Complete geology report is available from SCS.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	Complete report for design computations, hydrology & hydraulics, dam stability and seepage studies is available from SCS.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY } FIELD }	Complete material investigations, boring records, laboratory studies and classifications of materials and field observations and classifications are available from SCS.
POST-CONSTRUCTION SURVEYS OF DAM	Completion of dam survey information is available from SCS.
BORROW SOURCES	The location of borrow source is shown on page 2 of Appendix E.

ITEM	REMARKS
MONITORING SYSTEMS	No monitoring systems are inplace on the site.
MODIFICATIONS	Design modifications of the drop spillway system delayed construction for approximately one year beginning in July 1977.
HIGH POOL RECORDS	Since the structure was completed in October 1979, the reservoir has not been filled because of construction activities at Assunpink Creek Dam No. 6 about 5 miles upstream; therefore, high pool records do not exist.
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	Post construction inspection reports prepared by SCS are available from SCS.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	The structure has not been involved in any prior accidents or failures.
MAINTENANCE OPERATION RECORDS	Maintenance and operation records are available from Mercer Co. and SCS.

ITEM	REMARKS
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SPILLWAY PLAN	Refer to drawings in Appendix E.
SECTIONIS	
DETAILS	

OPERATING EQUIPMENT PLANS & DETAILS	Refer to drawings in Appendix E.
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MISCELLANEOUS	
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APPENDIX

B

Check List
Visual Inspection
Phase I

CHECK LIST
VISUAL INSPECTION
PHASE I

Sheet 1 of 8

Name Dam Assunpink Creek, Site 20 County Mercer State New Jersey National ID # NJ00552
Type of Dam Compacted zoned earth Hazard Category Significant
Date(s) Inspection 5/6/81 Weather Warm & hazy Temperature 70°
(6/2/81) (5/6/81)

Pool Elevation at Time of Inspection + 54 M.S.L. Tailwater at Time of Inspection + 54 M.S.L.
(5/6/81) (5/6/81)

Inspection Personnel:

Leonard R. Beck Richard F. Horvath Jon Rauschkolb
Lee DeHeer (6/2/81)
Richard F. Horvath Recorder

Remarks:

We were accompanied on the inspection by, William Heffernan, Project Engineer, Soil Conservation Service
Edward Lisiecki, Executive Secretary, Mercer Co. Parks Commission.

EMBANKMENT

Sheet 2 of 8

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	No surface cracks were observed.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	No unusual movement or cracking at or beyond the toe was observed.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	No sloughing or erosion of embankment or abutment slopes were observed.	
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	The vertical and horizontal alignment of the crest of the dam is excellent.	
RIPRAP FAILURES	All the nongrouted riprap on the site appears to be in excellent condition. Up to one-foot diameter voids were observed at the junction of the embankment and grouted riprap on the approach to the drop spillway.	Voids should be backfilled with selected compacted soil.

EMBANKMENT

Sheet 3 of 8

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
DRAINS	Because the tailwater & headwater were at the same level during the inspection, the competence of the internal drainage system could not be appraised.	The drains should be appraised after the reservoir has been filled.
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	No problems were apparent at the junctions of the embankment with the abutments, spillway or dam.	
ANY NOTICEABLE SEEPAGE	No seepage was observed.	
STAFF GAGE AND RECORDER	None on site.	

OUTLET WORKS

Sheet 4 of 8

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	None observed. The concrete appears to be in good condition.	
INTAKE STRUCTURE	Appears to be in good condition.	
OUTLET STRUCTURE	The outlet structure is the apron of the drop spillway which was under approximately 5 feet of water at the time of the inspec- tion.	
OUTLET CHANNEL	The outlet channel is the outlet for the drop spillway which appears to be in good condition.	
EMERGENCY GATE	All three gates on the intake riser structure are new and appear to be in excellent condition.	

UNIGATED SPILLWAY

Sheet 5 of 8

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	The concrete weir appears to be in good condition except that the horizontal alignment varies by a few inches over the 340-length of the weir.	It appears that the variance in horizontal alignment is a result of form placement during construction.
APPROACH CHANNEL	The approach channel which is the impoundment is free of obstructions.	
DISCHARGE CHANNEL	The discharge channel appears to be adequate to handle the discharge. The Quaker Bridge Rd bridge about 3,000 feet downstream of the dam could impede flow during large storm events.	
BRIDGE AND PIERS	Not Applicable.	

INSTRUMENTATION

Sheet 6 of 8

REMARKS OR RECOMMENDATIONS

OBSERVATIONS

VISUAL EXAMINATION

None observed.

MONUMENTATION/SURVEYS

OBSERVATION WELLS

None Observed.

WEIRS

None Observed.

PIEZOMETERS

None Observed.

OTHER

RESERVOIR

Sheet 7 of 8

REMARKS OR RECOMMENDATIONS

OBSERVATIONS

VISUAL EXAMINATION OF

SLOPES

The slopes along the perimeter of the reservoir are for the most part very gradual (1 to 2 percent). In a few areas the slopes are as steep as 20 percent.

SEDIMENTATION

Not applicable because the reservoir has not been filled.

DOWNSTREAM CHANNEL

Sheet 8 of 8

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	The downstream channel flows through wooded and open meadow areas. Trees are growing on the channel banks in the wooded areas. Fallen trees, branches, etc. form obstructions in some channel reaches.	
SLOPES	The average slope of the invert of the creek channel is about 0.1 of a percent. The channel banks vary between 1H:1V and 2H:1V.	
APPROXIMATE NO. OF HOMES AND POPULATION	One home and one industrial building are located in the vicinity of the creek between Assumpink Creek No. 20 dam and Whitehead Mill Pond about 3 miles downstream. The lowest door sill of the house about, 0.5 miles downstream of the dam, is about 10 feet above the normal stream surface. The lowest door sill of the factory about 1.5 miles downstream of the dam is about 8 feet above the normal stream surface.	

APPENDIX

C

Hydrologic & Hydraulic Data

ASSUNPINK CREEK DAM NO. 20
APPENDIX C
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

TABLE OF CONTENTS

	<u>Sheet No.</u>
Total Drainage Area Above Assunpink Site 20	1
Stacking Order	1
PMP Calculations	1
Stage-Storage & Stage-Discharge, Assunpink Site 18	2
Stage-Storage & Stage-Discharge, Assunpink Site 19	3
Stage-Storage & Stage-Discharge, Assunpink Site 4	4
Stage-Storage & Stage-Discharge, Assunpink Site 5	5
Stage-Storage & Stage-Discharge, Assunpink Site 6	6
Typical Channel Sections	7 through 10
Stage-Storage & Stage-Discharge, Assunpink Site 20	11
Reservoir Drawdown Calculations	11A
HEC-1, Dam Safety Version, Computer Printout	12 through 39



SUBJECT	ASSUNPINK NO. 20	SHEET	1	BY	JFR	DATE	6-9-81	JOB NO	1800-006-113
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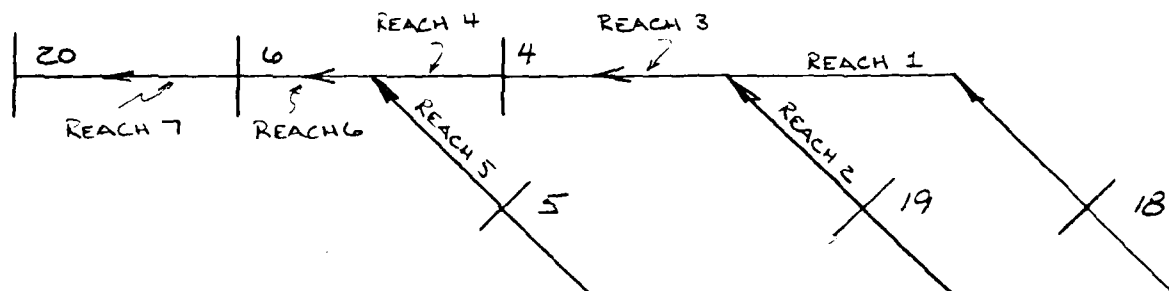
✓ 6/15/81

HYDROLOGY CALCULATIONS

THE FOLLOWING DATA WAS PROVIDED BY SCS.

TOTAL DRAINAGE AREA ABOVE SITE 20 = 32.99 S.M.

<u>DRAINAGE AREAS :</u>	SITE 18	1.21 S.M.
	SITE 19	1.77 S.M.
	SITE 4	5.98 S.M.
	SITE 5	1.36 S.M.
	SITE 6	<u>11.71 S.M.</u>
		22.03 S.M.

UNCONTROLLED D.A. OF SITE 20 = $32.99 - 22.03 = 10.96$ SASTACKING ORDERPMP CALCULATIONS (HMR 33)

FOR 200 S.M. - 24 HOURS, PMP = 23.2 INCHES

HR	%
6	101
12	110
24	120
48	132

DRAINAGE BASIN IS IN ZONE 6 OF
THE ALL-SEASON ENVELOPE

**O'BRIEN & GERE**

SUBJECT	SHEET	BY	DATE	JOB NO.
ASSUNPINK No. 20	2	JFR	6-9-81	1800-006-113

✓ 6/15/81

SITE 18 DATA

$$T_c = 1.5 \text{ HR.}, L = 0.6(115) = 0.90 \text{ HR.}$$

$$\text{CREST ELEV. LOW STAGE} = 172' \text{ MSL}$$

$$\text{CREST ELEV. EMERGENCY SPILLWAY} = 176.2' \text{ MSL}$$

$$\text{WEIR LENGTH EMER. SPWY} = 75'$$

$$\text{TOP OF DAM ELEV.} = 179.5' \text{ MSL}$$

$$\text{LENGTH OF DAM} = 1405'$$

<u>ELEVATION</u>	<u>STORAGE</u>	<u>SPILLWAY</u> <u>CFS</u>
172.0	346 AC-FT	0
173.8	421	6
175.4	498	21
176.2	539	71
176.8	575	218
178.0	644	615
179.0	703	1077
179.5	732	1342
180.0	761	1629
180.5	790	1936

FROM SCS

DAM OVERTOPPING DISCHARGE WILL BE INPUT ON A
\$D CARD ASSUMING $C_w = 2.7$.

**O'BRIEN & GERE**

SUBJECT	ASSUNPINK No. 20	SHEET	3	BY	JFR	DATE	6-9-81	JOB NO.	1800-006-113
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✓ 6/15/81

SITE 19 DATA

$$T_c = 2.5 \text{ HR.}, L = 0.6(2.5) = 1.5 \text{ HR.}$$

$$\text{LOW STAGE CREST ELEV.} = 155.9' \text{ MSL}$$

$$\text{EMERGENCY SPILLWAY CREST ELEV.} = 160.9' \text{ MSL}$$

$$\text{WEIR LENGTH EMER. SPWY.} = 75'$$

$$\text{TOP OF DAM ELEV.} = 164.9' \text{ MSL}$$

$$\text{LENGTH OF DAM} = 520'$$

ELEVATION	STORAGE	SPILLWAY CFS
155.9	462 AC-FT	0
159.0	662	12
160.0	726	61
160.9	812	118
162.0	918	355
163.0	1008	738
164.0	1097	1230
164.9	1185	1746
166.0	1274	2460
167.0	1362	3181

FROM SCS

DAM OVERTOPPING DISCHARGE IS INPUT ON A \$D
CARD ASSUMING $C_w = 2.7$

**O'BRIEN & GERE**

SUBJECT	SHEET	BY	DATE	JOB NO
ASSUNPINK No. 20	4	JFR	6-9-81	1800-006-113

SITE 4 DATA

$$T_c = 6.80 \text{ HR.}, L = 0.6 (6.80) = 4.08 \text{ HR.}$$

$$\text{LOW STAGE CREST ELEV.} = 110.0' \text{ MSL}$$

$$\text{EMERGENCY SPILLWAY CREST ELEV.} = 114.2' \text{ MSL}$$

$$\text{EMER. SPWY. CREST LENGTH} = 250'$$

$$\text{TOP OF DAM ELEV.} = 118.7' \text{ MSL}$$

$$\text{LENGTH OF DAM} = 3200'$$

<u>ELEVATION</u>	<u>STORAGE</u>	<u>SPILLWAY</u> <u>CFS</u>
110.0	1158 AC-FT	0
111.0	1410	28
112.0	1685	53
113.1	2037	113
114.2	2448	290
115.5	2985	1416
117.5	3798	4485
118.7	4283	6896
120.0	4809	9894
121.0	5214	12445

FROM SCS

DAM OVERTOPPING DISCHARGE IS INPUT ON A \$D CARD
ASSUMING $C_w = 2.7$.



SUBJECT	SHEET	BY	DATE	JOB NO.
ASSUNPINK No. 20	5	JFR	6-9-81	1800-006-113

SITE 5 DATA

$$T_c = 2.64 \text{ HR.}, L = 0.6(2.64) = 1.58 \text{ HRS.}$$

$$\text{LOW. STAGE CREST ELEV.} = 102.7' \text{ MSL}$$

$$\text{EMERGENCY SPILLWAY CREST ELEV.} = 106.4' \text{ MSL}$$

$$\text{EMER. SPILLWAY CREST LENGTH} = 50'$$

$$\text{TOP. OF DAM ELEV.} = 110.0' \text{ MSL}$$

$$\text{LENGTH OF DAM} = 2850'$$

<u>ELEVATION</u>	<u>STORAGE</u>	<u>SPILLWAY CFS</u>
102.7	110 AC-FT.	0
104.7	254	10
105.8	378	29
106.4	469	41
107.0	569	105
108.0	735	318
110.0	1180	971
112.0	1730	1842
114.0	2350	2885
116.0	3160	4075

FROM SGS

DAM OVERTOPPING DISCHARGE IS INPUT ON \$D CARD
ASSUMING $C_w = 2.7$.



O'BRIEN & GERE

SUBJECT	ASSUNPINK No. 20	SHEET	6	BY	JFR	DATE	6-9-81	JOB NO	1800-006-113
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SITE 6 DATA $T_c = 1.1 \text{ HRS.}$, $L = 10.6 (11) = 6.6 \text{ HRS.}$

LOW STAGE CREST ELEV. = 79.3' MSL

EMERGENCY SPILLWAY CREST ELEV. = 88.5' & 96.0' MSL

EMER. SPILLWAY WEIR LENGTH = 150' & 200', RESPECTIVELY

TOP OF DAM ELEV. = 101.0' MSL

LENGTH OF DAM = 2680'

<u>ELEVATION</u>		<u>STORAGE</u>	<u>SPILLWAY</u> <u>CFS</u>
79.3		150 AC-FT	0
82.0		389	140
85.5		984	160
87.0		1399	443
88.5	2516	1902	2498 966
92.0		3608	5777
94.0		5022	9991
96.0		6759	14952
98.0		9461	21788
102.0		16256	41863

DAM OVERTOPPING DISCHARGE IS INPUT ON A \$D CARD
 ASSUMING $C_w = 2.7$.

FORM 1-79

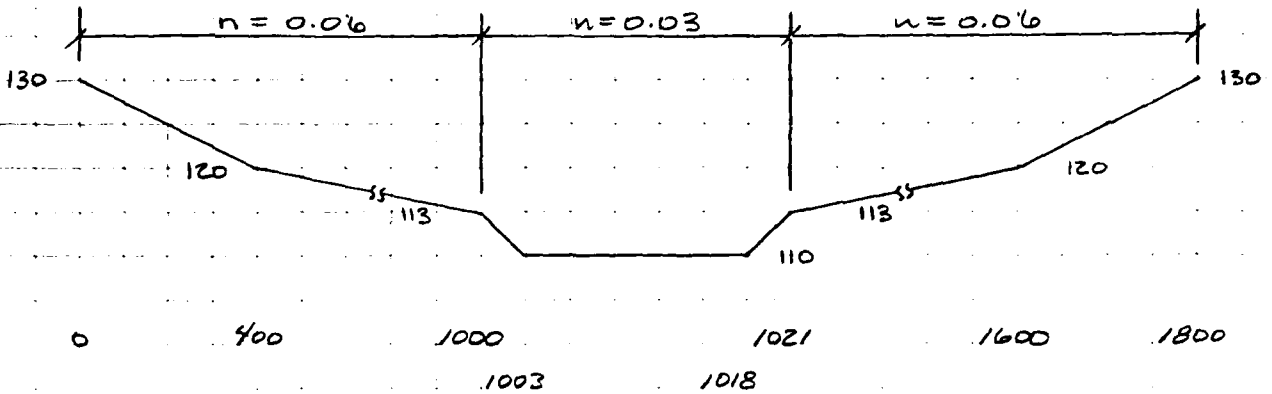


O'BRIEN & GERE

SUBJECT	SHEET	BY	DATE	JOB NO
ASSUNPINK No. 20	7	JFR	6-10-81	1800-006-113

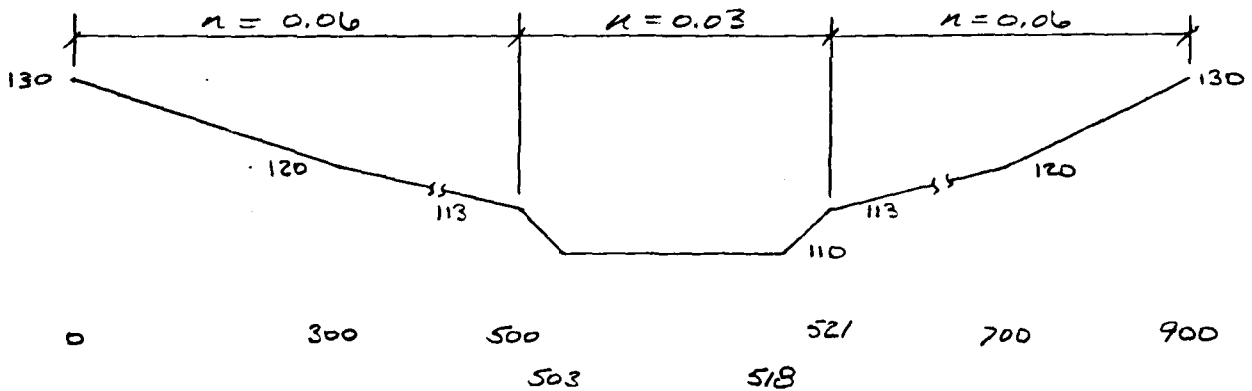
TYPICAL CHANNEL SECTIONS

DOWNSTREAM OF SITE 18 (REACH 1)



Reach Length $\approx 9000'$, Slope $\approx 0.003 \text{ ft/ft}$

DOWNSTREAM OF SITE 19 (REACH 2)



Reach Length $\approx 4800'$, Slope $\approx 0.005 \frac{\text{ft}}{\text{ft}}$



O'BRIEN & GERE

SUBJECT

ASSUNPINK No. 20

SHEET

8

BY

JFR

DATE

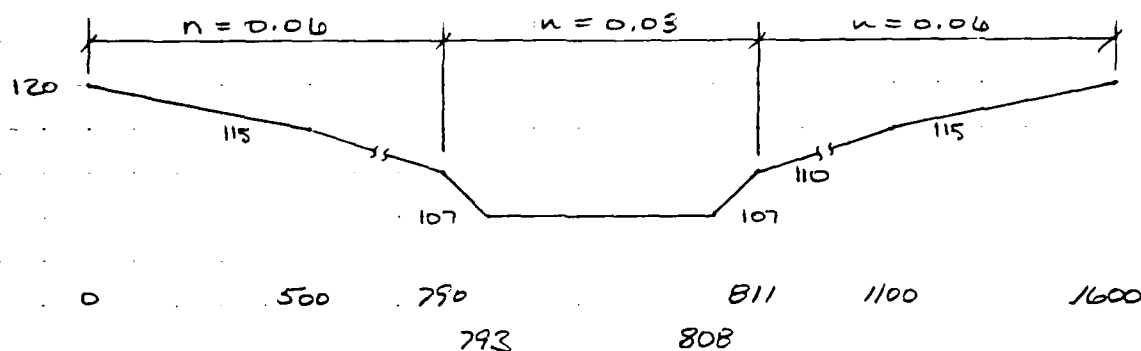
6-10-81

JOB NO

1800-006-113

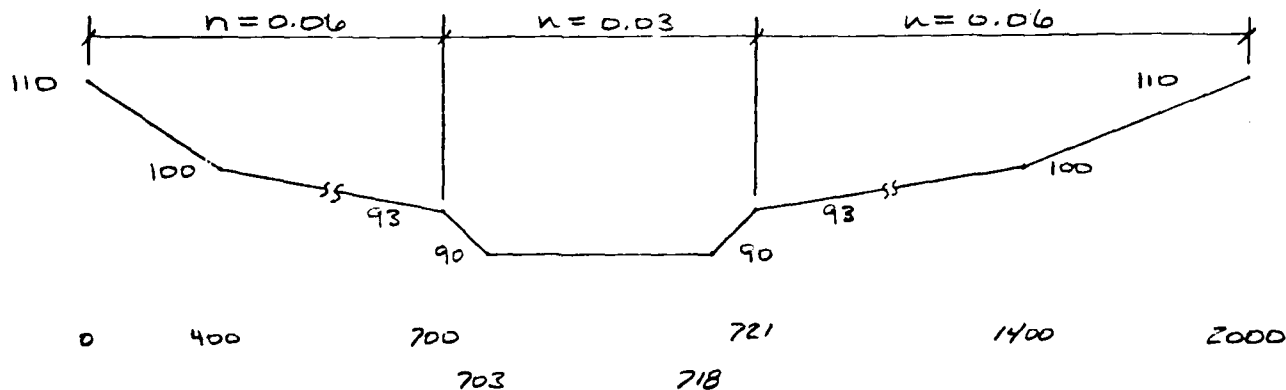
TYPICAL CHANNEL SECTIONS (CONT'D.)

REACH 3



Reach Length $\approx 3000'$, Slope $\approx 0.001 \frac{ft}{ft}$

DOWNSTREAM OF SITE 4 (REACH 4)



Reach Length $\approx 5500'$, Slope $\approx 0.0011 \frac{ft}{ft}$



O'BRIEN & GERE

SUBJECT

ASSUNPINK No. 20

SHEET

9

BY

JFR

DATE

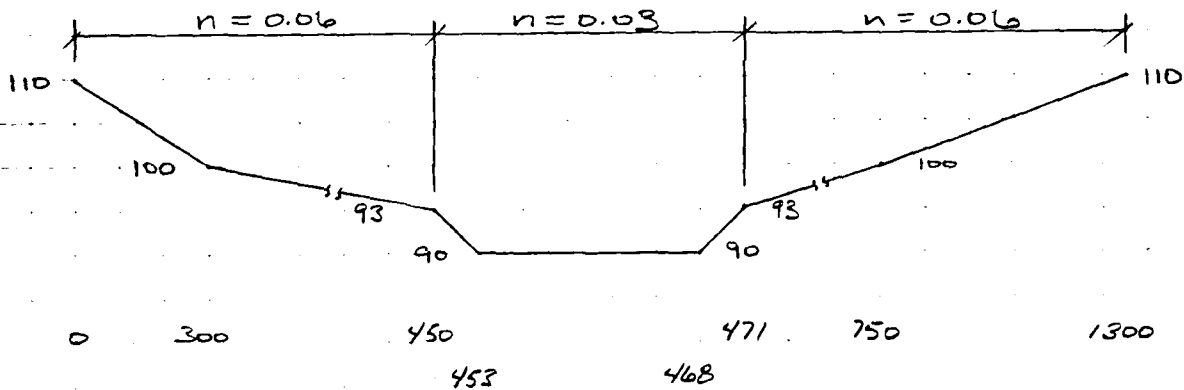
6-10-81

JOB NO

1800-006-113

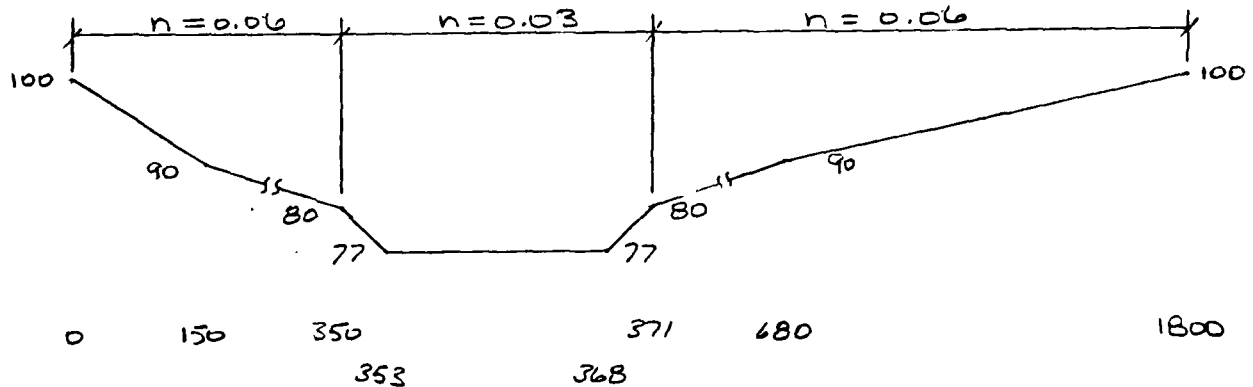
TYPICAL CHANNEL SECTIONS (CONT'D.)

DOWNSTREAM OF SITE 5 (REACH 5)



Reach Length ≈ 4800 , Slope $\approx 0.0014 \frac{ft}{ft}$

REACH 6



Reach Length $\approx 6000'$, Slope $\approx 0.0022 \frac{ft}{ft}$

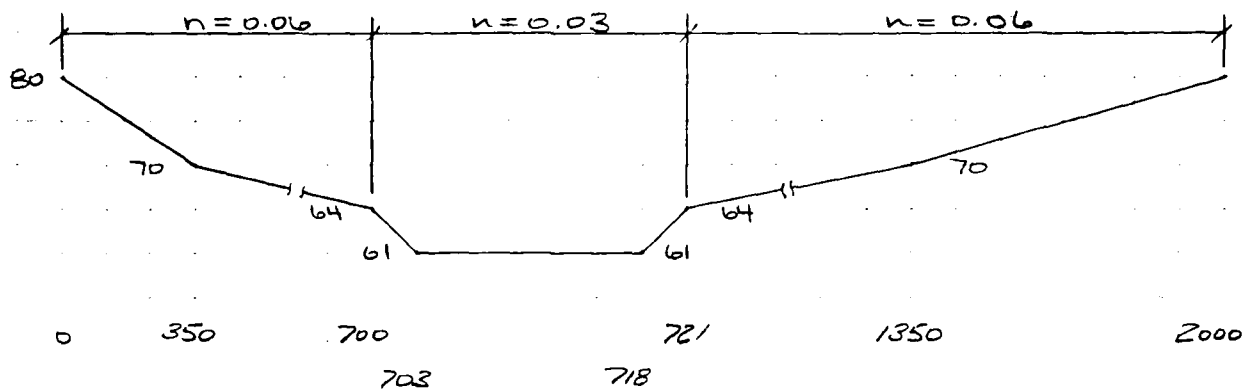


O'BRIEN & GERE

SUBJECT	ASSUNPINK NO. 20	SHEET	10	BY	JFR	DATE	6-10-81	JOB NO.	1800-006-113
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TYPICAL CHANNEL SECTIONS (CONT'D.)

DOWNSTREAM OF SITE 6 (REACH 7)



Reach Length $\approx 16,500'$, Slope ≈ 0.0011



O'BRIEN & GERE

SUBJECT

ASSUNPINK NO. 20

SHEET

11

BY

JFR

DATE

6-11-81

JOB NO

1800-006-113

ASSUNPINK NO. 20 DATA

$$T_c = 6.90 \text{ HRS.}, L = 0.6 (6.90) = 4.14 \text{ HRS.}$$

$$\text{PRINCIPAL SPILLWAY RISER CREST ELEV.} = 64.0' \text{ MSL}$$

$$\text{PRINCIPAL DROP SPILLWAY CREST ELEV.} = 66.5' \text{ MSL}$$

$$\text{LENGTH} = 90'$$

$$\text{AUXILIARY DROP SPILLWAY CREST ELEV.} = 69.25' \text{ MSL}$$

$$\text{LENGTH} = 250'$$

$$\text{TOP OF DAM ELEV.} = 78.0$$

$$\text{LENGTH OF DAM} = 3830 - (250 + 90) = 3490'$$

ELEVATION	STORAGE AC-FT	PRINCIPAL SPILLWAY CFS	EMERGENCY SPILLWAY CFS	TOTAL DISCHARGE CFS
64.0	2700	0		0
64.8		53		53
65.6		150		150
66.5	3412	228		228
67.0		328		328
67.5		504		504
68.0		735		735
69.25	4837	1490	0	1490
70.0		2044	422	2466
72.0		3813	2964	6777
74.0		5892	6729	12621
76.0		8034	11899	19433
78.0	14732	10,176	16824	27,000

FROM SCS



SUBJECT	SHEET	BY	DATE	JOB NO.
Reservoir Storage Calculation	11A	JL	7/27/61	1800-006-113

Reservoir Storage Calculation

Elev.	Area (Ac.)	Vol. (cu ft)	Depth (ft)	Storage (A.F.)
64	245			
		265		1060
60	≈ 255			
		240	4.5	1050
55.5	≈ 225			

1) Normal Pool Surface

2) Res. Drain Pipe, 4' ϕ

Base flow for drainage area $\approx 15000 \times 53 \text{ mi}^2$
 $\approx 50 \text{ cfs.}$

Avg. discharge between Elevs. 64 & 60

$$Q = CAV \sqrt{2gh} = 0.6 \times 12.57 \times 8.025 \times \sqrt{3.5}^{\frac{1}{2}}$$

$$Q_T = 154 \text{ cfs.} \quad \therefore Q_{Net} = 154 - 50 = 104 \text{ cfs.}$$

Time to draw-down from El. 64 to El. 60

$$= \frac{1060 \text{ A.F.} \times 43560 \text{ Ft}^2/\text{Ac}}{104 \text{ cfs.} \times 86400 \text{ sec/day}} = 5.16 \text{ days}$$

Avg. discharge between Elevs. 60 & 55.5

$$Q_T = 0.6 \times 12.57 \times 8.025 \times \sqrt{2.25}^{\frac{1}{2}} = 91 \text{ cfs.}$$

$$Q_{Net} = 91 - 50 = 41 \text{ cfs.}$$

Time to draw-down from El. 60 to El. 55.5

$$= \frac{1050 \text{ A.F.} \times 43560 \text{ Ft}^2/\text{Ac}}{41 \text{ cfs.} \times 86400 \text{ sec/day}} = 13.28 \text{ days}$$

→ Total estimated time to draw Res. down from El. 64 to El. 55.5 $\approx 18.44 \text{ days}$

OUTFLOW FROM SITES 18 & 19 ROUTED THROUGH REACH 3									
59	N1								
60	Y	1							
61	Y1	1							
62	Y6	.06	.03	.06	107	120	3000	.001	
63	Y7	0	120	500	115	790	110	793	
64	Y7	811	110	1100	115	1600	120		107
65	N	0	S-4	0	0	0	0	1	
66	N1								
67	M	1	2	5.98	32.99				
68	P	0	23.2	101	110	120	132		
69	T							1.0	.05
70	W2		4.08						
71	X	-1.5	-.05	2					
72	N	2	S-4	0	0	0	0	1	
73	N1								
74	N	1	D-4	0	0	0	0	1	
75	N1								
76	Y	1							
77	Y1	1							
78	Y4	110	111	112	113.1	114.2	115.5	117.5	118.7
79	Y5	0	-28	53	113	114	115	116	117
80	S	1158	1410	1685	2037	2448	2985	3798	4283
81	S	110	111	112	113.1	114.2	115.5	117.5	118.7
82	S	110							
83	S	118.7	2.7	1.5	3200				
84	N	1	R-4	0	0	0	0	1	
85	N1								
86	Y	1							
87	Y1	1							
88	Y6	.06	.03	.06	90	110	5500	.001	
89	Y7	0	110	400	100	700	93	703	
90	Y7	721	93	1400	100	2000	110		90
91	N	0	S-5	0	0	0	0	1	
92	N1								
93	M	1	2	1.36	32.99				
94	P	0	23.2	101	110	120	132		
95	T							1.0	.05
96	W2		1.58						
97	X	-1.5	-.05	2					
98	N	1	D-5	0	0	0	0	1	
99	N1								
100	Y	1							
101	Y1	1							
102	Y4	102.7	104.7	105.8	106.4	107	108	110	112
103	Y5	0	-10	29	41	105	318	971	1842
104	S	110	254	378	469	569	735	1180	1730
105	S	102.7	104.7	105.8	106.4	107	108	110	112
106	S	102.7							
107	S	110	2.7	1.5	2850				
108	N	1	R-5	0	0	0	0	1	
109	N1								
110	Y	1							
111	Y1	1							
112	Y6	.06	.03	.06	90	110	4800	.001	
113	Y7	0	110	300	100	450	93	453	
114	Y7	471	93	750	100	1300	110		90
115	N	2	R-6	0	0	0	0	1	
116	N1								
117	N	1	R-6	0	0	0	0	1	

OUTFLOW FROM SITES 18 & 19 ROUTED THROUGH REACH 3									
59	N1	1							
60	Y	1							
61									
62	Y6	.06	.03	.06	107	120	3000	.001	
63	Y7	0	120	500	115	790	110	793	
64	Y7	811	110	1100	115	1600	120		107
65	K	0	S-4	0	0	0	0	1	
66	N1								
67	M	1	2	5.98					
68	P	0	23.2	101	110	120	132	1.0	.05
69	T								
70	W2		4.08						
71	X	-1.5	-.05	2	0	0	0	1	
72	K	2	S-4	0	0	0	0	1	
73	N1								
74	N	1	D-4	0	0	0	0	1	
75	N1								
76	Y	1							
77	Y1	1							
78	Y4	110	111	112	113.1	114.2	115.5	117.5	118.7
79	Y5	0	28	53	113	290	1416	4485	8896
80	Y5	1158	1410	1685	2037	2448	2985	3798	4283
81	Y6	110	111	112	113.1	114.2	115.5	117.5	118.7
82	Y6	110							
83	Y0	118.7	2.7	1.5	3200				
84	N	1	R-4	0	0	0	0	1	
85	N1								
86	Y	1							
87	Y1	1							
88	Y6	.06	.03	.06	90	110	5500	.001	
89	Y7	0	110	400	100	700	93	703	90
90	Y7	721	93	1400	100	2000	110		718
91	N	0	5-5	0	0	0	0	1	
92	N1								
93	M	1	2	1.36					1
94	P	0	23.2	191	110	120	132	1.0	.05
95	T								
96	W2		1.58						
97	X	-1.5	-.05	2	0	0	0	1	
98	K	1	D-5	0	0	0	0	1	
99	N1								
100	Y	1							
101	Y1	1							
102	Y4	102.7	104.7	105.8	106.4	107	108	110	112
103	Y5	0	10	29	41	105	318	971	1842
104	Y5	110	254	378	469	569	735	1180	1730
105	Y6	102.7	104.7	105.8	106.4	107	108	110	112
106	Y6	102.7							
107	Y0	110	2.7	1.5	3850				
108	N	1	R-5	0	0	0	0	1	
109	N1								
110	Y	1							
111	Y1	1							
112	Y6	.06	.03	.06	96	110	4800	.0014	
113	Y7	0	110	300	100	450	93	453	90
114	Y7	471	93	750	100	1300	110		468
115	N	-2	R-6	0	0	0	0	1	
116	N1								
117	N	1	R-6	0	0	0	0	1	

Sh 13

[illegible]

RUNOFF HYDROGRAPH AT S-10
 ROUTE HYDROGRAPH TO D-18
 ROUTE HYDROGRAPH TO R-1
 RUNOFF HYDROGRAPH AT S-19
 ROUTE HYDROGRAPH TO D-19
 ROUTE HYDROGRAPH TO R-2
 COMBINE 2 HYDROGRAPHS AT R-3
 ROUTE HYDROGRAPH TO R-3
 RUNOFF HYDROGRAPH AT S-4
 COMBINE 2 HYDROGRAPHS AT D-4
 ROUTE HYDROGRAPH TO R-4
 RUNOFF HYDROGRAPH AT S-5
 ROUTE HYDROGRAPH TO D-5
 ROUTE HYDROGRAPH TO R-5
 COMBINE 2 HYDROGRAPHS AT R-6
 ROUTE HYDROGRAPH TO R-6
 RUNOFF HYDROGRAPH AT S-6
 COMBINE 2 HYDROGRAPHS AT D-6
 ROUTE HYDROGRAPH TO R-7
 RUNOFF HYDROGRAPH AT S-20
 COMBINE 2 HYDROGRAPHS AT S-20
 ROUTE HYDROGRAPH TO D-20
 END OF NETWORK

 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION JULY 1978
 LAST MODIFICATION 01 APR 80

RUN DATE* 81/06/15.
 TIME* 12:40:47.

NATIONAL DAM SAFETY PROGRAM
 ASSUMPTION SITE NO. 20
 PHF HYDROGRAPH

JOB SPECIFICATION
 JDAY= 0 IHR= 0 IMIN= 0 METRC= 0
 JOER= 0 NWT= 0 LROFT= 0 TRACE= 0
 5 0 0 0 0 0

MULTI-PLAN ANALYSES TO BE PERFORMED
 NPLAN= 1 NRATIO= 9 LRATIO= 1

RTIOS= .10 .15 .20 .25 .30 .35 .40 .45 .50

Sh 15

SUB-AREA RUNOFF COMPUTATION

INFLOW TO SITE 18

ISTAR ICOMP IECON ITAPE IJFLT JFRT INAME ISTAGE IAUTO
S-18 0 0 0 0 0 1 0 0

HYDROGRAPH DATA

IHYDG IUNG IAREA SNAP IRSDA IRSFC RATIO ISNOW ISAME LOCAL
1 2 1.21 0.00 32.99 0.00 0.000 0 1 0

FRECIP DATA

SPFE PMS R6 R12 R24 R48 R72 R96
0.00 23.20 101.00 110.00 120.00 132.00 0.00 0.00

TRSF COMPUTED BY THE PROGRAM IS .838

LOSS DATA

LROFT STRNR DLTKR RTIOL ERAIN STNKS RTIOK STRTL CNSTL ALSMX RTIMP
0 0.00 0.00 1.00 0.00 0.00 1.00 1.00 .05 0.00 0.00

UNIT HYDROGRAPH DATA
TC= 0.00 LAG= .90

RECESSION DATA

STRTO= -1.50 GRCSN= -.05 RTIOR= 2.00

END-OF-PERIOD FLOW

MO,DA HR,MN PERIOD RAIN EXCS LOSS COMP Q MO,DA HR,MN PERIOD RAIN EXCS LOSS COMP Q
0 MO,DA HR,MN PERIOD RAIN EXCS LOSS COMP Q
SUM 25.67 23.20 2.46 109292.
(552.14 589.14 63.14 3094.80)

HYDROGRAPH ROUTING

OUTFLOW FROM SITE 18

ISTAR ICOMP IECON ITAPE JPLT JFRT INAME ISTAGE IAUTO
D-18 1 0 0 0 0 1 0 0

ROUTING DATA

QLOSS CLOSS AVG IRES ISAME IOPT IFMP LSTR
0.0 0.000 0.00 1 1 0 0 0

NSTFS NSTDL LAG ANSKK X TSK STORA ISFRAT
1 0 0 0.000 0.000 0.000 -172. -1

STAGE 172.00 173.80 175.40 176.20 176.80 178.00 179.00 179.50 180.00 180.50
FLOW 0.00 6.00 21.00 71.00 218.00 615.00 1077.00 1342.00 1629.00 1936.00

CAPACITY= 346. 421. 498. 539. 575. 644. 703. 732. 761. 790.

ELEVATION= 172. 174. 175. 176. 177. 178. 179. 180. 180. 181.

Sh 16

CREL SPWID COBW EXPW ELEV CORL CAREA EXPL
172.0 0.0 0.0 0.0 0.0 0.0 0.0

DAM DATA
TOPEL COOD EXPD DAMWID
179.5 2.7 1.5 1405.

PEAK OUTFLOW IS 18. AT TIME 44.83 HOURS

PEAK OUTFLOW IS 88. AT TIME 41.50 HOURS

PEAK OUTFLOW IS 266. AT TIME 42.83 HOURS

PEAK OUTFLOW IS 448. AT TIME 42.50 HOURS

PEAK OUTFLOW IS 624. AT TIME 43.17 HOURS

PEAK OUTFLOW IS 833. AT TIME 41.83 HOURS

PEAK OUTFLOW IS 1031. AT TIME 41.67 HOURS

PEAK OUTFLOW IS 1239. AT TIME 41.50 HOURS

PEAK OUTFLOW IS 1593. AT TIME 41.33 HOURS

HYDROGRAPH ROUTING

SITE 18 OUTFLOW ROUTED THROUGH REACH 1

ISTAQ	ICOMP	IECDN	ITAPE	JPLT	JFRT	INAME	ISTAGE	IAUTO
1	1	0	0	0	0	1	0	0
ROUTING DATA								
RLCROSS	CLCROSS	AVG	IRES	ISAME	IDPT	IFMP	LSTR	
0.0	0.000	0.00	1	1	0	0	0	
NSIFS	MSIDL	LAG	AMSKK	X	TSK	STORA	ISPRAT	
1	0	0	0.000	0.000	0.000	-1.	0	

Sh 17

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
0600	0300	0600	110.0	130.0	9000+	00300

CROSS SECTION COORDINATES--STA.ELEV,STA.ELEV--ETC

0.00	130.00	400.00	120.00	1000.00	113.00	1003.00	110.00	1018.00	110.00
1021.00	113.00	1600.00	120.00	1800.00	130.00				

STORAGE	0.00	3.49	1301.04	7.44	12.28	41.91	110.10	216.84	362.15	546.02	768.44
	1026.32			1589.19	1891.68	2207.61	2537.27	2880.67	3237.91	3608.68	3993.20

OUTFLOW	0.00	44.11	26288.97	140.55	283.16	606.87	1365.99	2781.79	5018.43	8237.87	12585.78
	18603.76			35198.71	45326.84	56676.04	69254.79	83075.58	98153.81	114506.93	132153.99

STAGE	110.00	111.05	112.11	113.16	114.21	115.26	116.32	117.37	118.42	119.47
	129.53	131.58	132.63	133.68	134.74	135.79	136.84	137.89	138.95	139.60

FLOW	0.00	44.11	26288.97	140.55	283.16	606.87	1365.99	2781.79	5018.43	8237.87	12585.78
	18603.76			35198.71	45326.84	56676.04	69254.79	83075.58	98153.81	114506.93	132153.99

MAXIMUM STAGE IS 110.4

MAXIMUM STAGE IS 111.5

MAXIMUM STAGE IS 113.0

MAXIMUM STAGE IS 113.5

MAXIMUM STAGE IS 114.0

MAXIMUM STAGE IS 114.4

MAXIMUM STAGE IS 114.6

MAXIMUM STAGE IS 114.8

MAXIMUM STAGE IS 115.1

Sh 18

SUB AREA RUNOFF COMPUTATION

INFLOW TO SITE 19

ISTAQ ICOMP IECON ITAFE JFLT JFRT INAME ISTAGE IAUTO
S-19 0 0 0 0 0 0 1 0 0

HYDROGRAPH DATA

IHYDG IUNG TAREA SNAP TRSDA TRSPC RATIO ISNOW ISAME LOCAL
1 2 1.77 0.00 32.99 0.00 0.00 0.00 0 1 0

PRECIP DATA

SFFE FMS R6 R12 R24 R48 R72 R96
0.00 23.20 101.00 110.00 120.00 132.00 0.00 0.00

TRSPC COMPUTED BY THE PROGRAM IS .838

LOSS DATA

LROFT STRNR DLTNR RTIOL ERAIN STRKS RTIOK SIRTU CNSTL ALSMX RTIMP
0 0.00 0.00 1.00 0.00 0.00 1.00 1.00 0.05 0.00 0.00

UNIT HYDROGRAPH DATA

IC 0.00 LAG 1.50

RECESSION DATA

STRIO 1.50 ORCSN 1.05 RTIOR 2.00

END-OF-PERIOD FLOW

MO.DA HR.MN PERIOD RAIN EXCS LOSS COMP Q MO.DA HR.MN PERIOD RAIN EXCS LOSS
0 MO.DA HR.MN PERIOD RAIN EXCS LOSS COMP Q MO.DA HR.MN PERIOD RAIN EXCS LOSS

SUM 25.67 23.20 2.46 1589.14
(652.) (589.) (63.) (4497.11)

HYDROGRAPH ROUTING

OUTFLOW FROM SITE 19

ISTAQ ICOMP IECON ITAFE JFLT JFRT INAME ISTAGE IAUTO
S-19 1 0 0 0 0 0 1 0 0

ROUTING DATA

QLOSS CLOSS AVG IRES ISAME IOPT IFMP LSTR
0.0 0.000 0.00 1 1 0 0 0 0

NSTFS NSTDL LAG AMSKN X TSK STORA ISFRAT
1 0 0 0.000 0.000 0.000 -156. -1

STAGE 155.90 159.00 160.00 160.90 162.00 163.00 164.00 164.90 166.00 167.00
FLOW 0.00 12.00 61.00 118.00 355.00 738.00 1230.00 1746.00 2460.00 3181.00

CAPACITY 442. 662. 726. 812. 918. 1008. 1097. 1185. 1274. 1362.

ELEVATION 156. 159. 160. 161. 162. 163. 164. 165. 166. 167.

9419

CREL SPWD CORN EXPW ELEV COQL CAREA EXPL
155.9 0.0 0.0 0.0 0.0 0.0 0.0

DAM DATA
TOFEL COND EXFD DAMWID
164.9 2.7 1.5 520.

PEAK OUTFLOW IS 17. AT TIME 48.33 HOURS
PEAK OUTFLOW IS 80. AT TIME 45.17 HOURS
PEAK OUTFLOW IS 173. AT TIME 40.50 HOURS
PEAK OUTFLOW IS 326. AT TIME 44.00 HOURS
PEAK OUTFLOW IS 546. AT TIME 43.67 HOURS
PEAK OUTFLOW IS 770. AT TIME 43.33 HOURS
PEAK OUTFLOW IS 1019. AT TIME 43.17 HOURS
PEAK OUTFLOW IS 1255. AT TIME 43.00 HOURS
PEAK OUTFLOW IS 1492. AT TIME 42.83 HOURS

HYDROGRAPH ROUTING

SITE 19 OUTFLOW ROUTED THROUGH REACH 2

ISTAR IGAME IECON ITAPE JPLI JFRT INAME ISTAR I AUTO
R-2 1 0 0 0 0 1 0
ROUTING DATA
ALOSS CLOSS AVG IRES ISAME IOFT IFMP LSTR
0.0 0.000 0.00 1 1 0 0 0
NSTPS NSTUL LAG AMENK A ISK STORA ISPRAT
1 0 0 0.000 0.000 0.000 -1. 0

NORMAL DEPTH CHANNEL ROUTING

DN(1) DN(2) DN(3) ELNUT ELMAX RLNTH SEL
.0600 .0300 .0600 110.0 130.0 4800. .00500

CROSS SECTION COORDINATES - STA, ELEV, STA, ELEV -- ETC

	0.00	130.00	300.00	120.00	500.00	113.00	503.00	110.00	518.00	110.00	
	521.00	113.00	700.00	120.00	900.00	130.00					
STORAGE	0.00	186.48	303.39	3.97	6.39	13.12	26.47	46.42	72.99	106.16	145.95
	192.28	244.78	303.39	368.10	438.92	515.84	598.87	688.00	783.23	884.57	
OUTFLOW	0.00	56.94	181.45	365.09	678.23	1210.48	2045.70	3254.80	47930.22	7045.17	
	9760.45	13091.12	17059.72	21708.97	27080.52	33214.97	40151.96	47930.22	56587.63	66161.31	
STAGE	110.00	111.05	112.11	113.16	114.21	115.26	116.32	117.37	118.42	119.47	
	120.53	121.58	122.63	123.68	124.74	125.79	126.84	127.89	128.95	130.00	
FLOW	0.00	56.94	181.45	365.09	678.23	1210.48	2045.70	3254.80	47930.22	7045.17	
	9760.45	13091.12	17059.72	21708.97	27080.52	33214.97	40151.96	47930.22	56587.63	66161.31	

MAXIMUM STAGE-1S --- -110.3-

MAXIMUM STAGE IS 111.2

MAXIMUM STAGE IS 112.0

MAXIMUM STAGE IS - - - 112.9

MAXIMUM STAGE IS 113.7

MAXIMUM STAGE IS	114.4
------------------	-------

MAXIMUM STAGE-15-114.9

MAXIMUM STAGE IS	115.3
------------------	-------

MAXIMUM STAGE IS 115.6

九九九九九九九九

東京大学文学部国文学科

COMBINE HYDROGRAPHHS

COMBINE DISCHARGES AT REACH 3.

ISIAQ	ICOMP	IECON	ITAPE	JFLT	JFRT	INAME	ISTAGE	IAUTO
0-1	0	0	0	0	0	1	0	0

本書は、本書の序文に「本書は、本書の序文に」

中國書畫函授大學

✱✱✱✱✱✱✱✱✱✱

HYDROGRAPH ROUTING-

OUTFLOW FROM SITES 18 & 19 ROUTED THROUGH REACH 3

ISTAQ R-3	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
0.0	1	0	0	0	0	1	0	0
			ROUTING DATA					
CLOSS	AUG	IRS	ISAME	IGRT	IFMP		LSTR	
0.0	0.00	1	1	0	0		0	
NSTFS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISFRAT	
1	0	0	0.000	0.000	0.000	-1.	0	

12 45

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
.0600	.0300	.0600	107.0	120.0	3000.	.00100

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00	120.00	500.00	115.00	790.00	110.00	793.00	107.00	808.00	107.00
811.00	110.00	1100.00	115.00	1600.00	120.00				

STORAGE	0.00	.74	1.54	2.41	3.34	5.03	10.19	19.08	31.70	48.05
	68.14	91.96	119.65	153.13	193.06	239.43	292.26	351.53	417.26	489.43

OUTFLOW	0.00	12.43	39.44	77.76	126.40	193.09	305.52	491.52	774.86	1176.34
	1714.87	2408.08	3232.43	4190.27	5412.15	6922.95	8748.01	10913.11	13443.11	16362.39

STAGE	107.00	107.68	108.37	109.05	109.74	110.42	111.11	111.79	112.47	113.16
	113.84	114.53	115.21	115.89	116.58	117.26	117.95	118.63	119.32	120.00

FLOW	0.00	12.43	39.44	77.76	126.40	193.09	305.52	491.52	774.86	1176.34
	1714.87	2408.08	3232.43	4190.27	5412.15	6922.95	8748.01	10913.11	13443.11	16362.39

MAXIMUM STAGE IS 108.3

MAXIMUM STAGE IS 110.1

MAXIMUM STAGE IS 111.4

MAXIMUM STAGE IS 112.3

MAXIMUM STAGE IS 112.9

MAXIMUM STAGE IS 113.5

MAXIMUM STAGE IS 113.9

MAXIMUM STAGE IS 114.3

MAXIMUM STAGE IS 114.7

SUR-AREA RUNOFF COMPUTATION

INFLOW TO SITE 4

ISTAG	IECON	ITAFE	JFLT	JPRI	INAME	ISTAGE	IAUTQ
S-4	0	0	0	0	I	0	0

HYDROGRAPH DATA

INPDC	INHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISARE	LOCAL
1	2	5.98	0.00	32.99	0.00	0.000	0	1	0

PRECIP DATA

SFFE	FMS	R4	R12	R24	R48	R72	R96
0.00	23.20	101.00	110.00	120.00	132.00	0.00	0.00

TRFPC COMPUTED BY THE PROGRAM IS .038

SH 22

LUSS DATA

LROFT	STRAR	DLTNR	RTIOL	ERAIN	STRNS	RTIOK	STRIL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA

TC= 0.00 LAG= 4.08

RECESSION DATA

STRIR= -1.50 ORCSN= -.05 RTIOR= 2.00

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
0													

SUM 25.67 23.20 2.46 503609.
(652.)(589.)(63.)(14260.62)

COMBINE HYDROGRAPHS

COMBINE RUNOFF TO SITE 4 WITH REACH 3 DISCHARGE

ISTAR	ICOMP	IECON	ITAPE	JFLT	JFRT	INAME	ISTAGE	IAUTO
S-4	2	0	0	0	0	1	0	0

HYDROGRAPH ROUTING

OUTFLOW FROM SITE 4

ISTAR	ICOMP	IECON	ITAPE	JFLT	JFRT	INAME	ISTAGE	IAUTO
D-4	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRCS	ISAME	IOFT	IPMP	LSTR
0.0	0.00	0.00	1	1	0	0	0

MSIPS	MSIDE	LAG	AMSK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-110.	-1

STAGE	110.00	111.00	112.00	113.10	114.20	115.50	117.50	118.70	120.00	121.00
FLOW	0.00	28.00	53.00	113.00	290.00	1416.00	4485.00	6896.00	9894.00	12445.00

CAPACITY	1158.	1410.	1685.	2037.	2448.	2985.	3798.	4283.	4809.	5214.
ELEVATION	110.	111.	112.	113.	114.	116.	118.	119.	120.	121.

SH 23

DAM DATA

TOPEL	COORD	EXFD	DAMWID
118.7	2.7	1.5	3200.

PEAK OUTFLOW IS 77. AT TIME 50.00 HOURS
 PEAK OUTFLOW IS 184. AT TIME 50.00 HOURS
 PEAK OUTFLOW IS 517. AT TIME 50.00 HOURS
 PEAK OUTFLOW IS 1066. AT TIME 48.83 HOURS
 PEAK OUTFLOW IS 1719. AT TIME 47.83 HOURS
 PEAK OUTFLOW IS 2514. AT TIME 47.17 HOURS
 PEAK OUTFLOW IS 3274. AT TIME 46.83 HOURS
 PEAK OUTFLOW IS 4016. AT TIME 46.50 HOURS
 PEAK OUTFLOW IS 4812. AT TIME 46.33 HOURS

HYDROGRAPH ROUTING

SITE 4 OUTFLOW ROUTED THROUGH REACH 4

ISTAR	ICOMP	IECON	ITAFE	JFLT	JFRT	INAME	ISTAGE	IAUTO
R-4	1	0	0	0	0	1	0	0
ROUTING-DATA								
QLOSS	CLOSS	AVG	IRIS	ISAME	IOPT	IFMP	LSTR	
0.0	0.000	0.00	1	1	0	0	0	
NSTFS NSTDL LAG AKSNK X TSK STORA ISFRAT								
1	0	0	0.000	0.000	0.000	-1.	0	

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
.0600	.0300	.0600	90.0	110.0	5500.	.00110

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
 0.00 110.00 400.00 100.00 700.00 93.00 703.00 90.00 718.00 90.00
 721.00 93.00 1400.00 100.00 2000.00 110.00

SH 24

STORAGE	0.00	2.13	4.55	7.42	22.97	58.04	112.68	186.89	280.67	394.01
	526.22	673.12	834.01	1008.89	1197.76	1400.62	1617.47	1848.31	2083.14	2351.96
OUTFLOW	0.00	26.71	85.11	171.41	355.14	764.12	1503.23	2660.78	4316.00	6541.95
	9495.63	13203.09	17600.48	22721.24	28599.30	35268.64	42763.07	51116.10	60360.86	70530.07
STAGE	90.00	91.05	92.11	93.16	94.21	95.26	96.32	97.37	98.42	99.47
	100.57	101.58	102.63	103.68	104.74	105.79	106.84	107.89	108.95	110.00
FLOW	0.00	26.71	85.11	171.41	355.14	764.12	1503.23	2660.78	4316.00	6541.95
	9495.63	13203.09	17600.48	22721.24	28599.30	35268.64	42763.07	51116.10	60360.86	70530.07

MAXIMUM STAGE IS 91.9
 MAXIMUM STAGE IS 93.2
 MAXIMUM STAGE IS 94.5
 MAXIMUM STAGE IS 95.7
 MAXIMUM STAGE IS 96.5
 MAXIMUM STAGE IS 97.2
 MAXIMUM STAGE IS 97.7
 MAXIMUM STAGE IS 98.2
 MAXIMUM STAGE IS 98.6

SUR-AREA RUNOFF COMPUTATION

INFLOW TO SITE 5

ISTAD	ICOMP	IECON	ITAFE	JFLT	IMNE	ISTAGE	LAUTE
S-5	0	0	0	0	1	0	0

HYDROGRAPH DATA

INHYG	TUNG	TAREA	SNAP	TRSTA	TRSFC	RATIO	ISNOW	ISAME	LOCAL
1	2	1.36	0.00	32.99	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	23.20	101.00	116.00	120.00	132.00	0.00	0.00

TRSFCE COMPUTED BY THE PROGRAM IS .838

LOSS DATA

LROFT	STRRR	ULTRR	RTIDL	ERAIN	STRRS	RTION	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA

1C=	0.00	LAG=	1.58
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RECESSION DATA

STRTO=	-1.50	ORCSN=	-.05	RTIO6=	2.00
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END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
-------	-------	--------	------	------	------	--------	-------	-------	--------	------	------	------	--------

SUM 25.67 23.20 2.46 121956.
 (452.31 589.31 62.31 3453.41)

SH 25:

HYDROGRAPH ROUTING

OUTFLOW FROM SITE 5

ISTAR ICOMP IECON ITAFE JFLT JFRT INAME ISTAGE IAUTO
 0-5 1 0 0 0 0 1 0 0

ROUTING DATA
 QLOSS CLOSS AVG IRES ISAME IOPT IFMP LSTR
 0.0 0.000 0.00 1 1 0 0 0

NSTFS NSTDL LAG AMSKK X TSK STORA ISPRAT
 1 0 0 0.000 0.000 0.000 -103. -1

STAGE 102.70 104.70 105.80 106.40 107.00 108.00 110.00 112.00 114.00 116.00

FLOW 0.00 10.00 29.00 41.00 105.00 318.00 971.00 1842.00 2883.00 4073.00

CAPACITY= 110. 254. 378. 469. 569. 735. 1180. 1730. 2390. 3160.

ELEVATION= 103. 105. 106. 106. 107. 108. 110. 112. 114. 116.

CREL SFUID COOW EXPW ELEV COOL CAREA EXPL
 102.7 0.0 0.0 0.0 0.0 0.0 0.0 0.0

DAM DATA

TOPEL COOD EXPD DAMWID
 110.0 2.7 1.5 2850.

PEAK OUTFLOW IS 12. AT TIME 48.83 HOURS

PEAK OUTFLOW IS 24. AT TIME 47.33 HOURS

PEAK OUTFLOW IS 35. AT TIME 47.17 HOURS

PEAK OUTFLOW IS 58. AT TIME 46.33 HOURS

PEAK OUTFLOW IS 101. AT TIME 45.67 HOURS

PEAK OUTFLOW IS 177. AT TIME 45.00 HOURS

PEAK OUTFLOW IS 253. AT TIME 44.67 HOURS

PEAK OUTFLOW IS 329. AT TIME 44.50 HOURS

PEAK OUTFLOW IS 413. AT TIME 44.33 HOURS

HYDROGRAPH ROUTING

SITE-5 OUTFLOW-ROUTED THROUGH REACH 5

ISTAG	ICOMP	IECON	ITAPE	JFLT	JFRT	INAME	ISTAGE	IAUTO
R-5	1	0	0	0	0	1	0	0
ROUTING DATA								
QLOSS	AUG	IKES	ISAME	IOFT	IFMP		LSTR	
0.0	0.00	1	1	0	0		.0	
NSTPS NSTDL LAG AMSKK X TSK STORA ISFRAT								
1	0	0	0.000	0.000	0.000	-1.	0	

NORMAL DEPTH CHANNEL ROUTING

ON(1)	ON(2)	ON(3)	ELNVT	ELMAX	RLNTH	SEL
0.000	0.0300	0.0600	90.0	110.0	4800.	0.00140

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00	110.00	300.00	100.00	450.00	93.00	453.00	90.00	468.00	90.00
471.00	63.00	750.00	100.00	1300.00	110.00				

STORAGE	0.00	1.86	277.57	3.97	6.40	13.70	28.48	50.75	80.50	117.73	162.44
	215.00			350.53	433.86	527.57	631.66	746.12	870.97	1006.19	1151.79
OUTFLOW	0.00	30.13	7414.10	96.01	193.20	362.37	658.98	1133.59	1828.90	2783.30	4032.30
	5552.62			9727.13	12534.30	15877.13	19795.90	24329.69	29516.43	35393.00	41995.35
STAGE	90.00	91.05	91.58	92.11	93.16	94.21	95.26	96.32	97.37	98.42	99.47
	100.53	101.58	102.63	103.68	104.74	105.79	106.84	107.89	108.95	110.00	
FLOW	0.00	30.13	7414.10	96.01	193.20	362.37	658.98	1133.59	1828.90	2783.30	4032.30
	5552.62			9727.13	12534.30	15877.13	19795.90	24329.69	29516.43	35393.00	41995.35

MAXIMUM STAGE IS 90.4

MAXIMUM STAGE IS 90.8

MAXIMUM STAGE IS 91.1

MAXIMUM STAGE IS 91.5

MAXIMUM STAGE IS 92.2

MAXIMUM STAGE IS 93.0

MAXIMUM STAGE IS 93.5

MAXIMUM STAGE IS 94.0

MAXIMUM STAGE IS 94.4

SH21

COMBINE DISCHARGES AT REACH 6

ISTATN	ICOMP	IECON	IYAFE	JPLT	JPKY	INAME	ISTAGE	IAUTO
R-6	1	0	0	0	0	1	0	0

HYDROGRAPH ROUTING

OUTFLOW FROM SITES 4 & 5 ROUTED THROUGH REACH 6

ISTAQ	ICOMP	IECON	ITAFE	JFLT	JFRT	INAME	ISTAGE	IAUTO
R-6	1	0	0	0	0	1	0	0
ROUTING DATA								
		IPRS	ISAME	IOPT	IPMP		LSIR	
0.0	0.000	1	1	0	0		0	
LAGS								
		LAGS	AMS5K	X	YSK	STORA	ISPRAT	
	0	0	0.000	0.000	0.000	-1.	0	
NSTPS								
	1							

NORMAL DEPTH CHANNEL ROUTING

QIN(1)	QIN(2)	QIN(3)	ELNVT	ELMAX	RLNTH	SEL
.0600	.0300	.0600	77.0	77.0	6000.	.00220

CLASS SECTION COORDINATES - STA, ELEV, STA, ELEV -- ETC

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100																																																																																																	
0.00	100.00	150.00	200.00	250.00	300.00	350.00	400.00	450.00	500.00	550.00	600.00	650.00	700.00	750.00	800.00	850.00	900.00	950.00	1000.00	1050.00	1100.00	1150.00	1200.00	1250.00	1300.00	1350.00	1400.00	1450.00	1500.00	1550.00	1600.00	1650.00	1700.00	1750.00	1800.00	1850.00	1900.00	1950.00	2000.00	2050.00	2100.00	2150.00	2200.00	2250.00	2300.00	2350.00	2400.00	2450.00	2500.00	2550.00	2600.00	2650.00	2700.00	2750.00	2800.00	2850.00	2900.00	2950.00	3000.00	3050.00	3100.00	3150.00	3200.00	3250.00	3300.00	3350.00	3400.00	3450.00	3500.00	3550.00	3600.00	3650.00	3700.00	3750.00	3800.00	3850.00	3900.00	3950.00	4000.00	4050.00	4100.00	4150.00	4200.00	4250.00	4300.00	4350.00	4400.00	4450.00	4500.00	4550.00	4600.00	4650.00	4700.00	4750.00	4800.00	4850.00	4900.00	4950.00	5000.00	5050.00	5100.00	5150.00	5200.00	5250.00	5300.00	5350.00	5400.00	5450.00	5500.00	5550.00	5600.00	5650.00	5700.00	5750.00	5800.00	5850.00	5900.00	5950.00	6000.00	6050.00	6100.00	6150.00	6200.00	6250.00	6300.00	6350.00	6400.00	6450.00	6500.00	6550.00	6600.00	6650.00	6700.00	6750.00	6800.00	6850.00	6900.00	6950.00	7000.00	7050.00	7100.00	7150.00	7200.00	7250.00	7300.00	7350.00	7400.00	7450.00	7500.00	7550.00	7600.00	7650.00	7700.00	7750.00	7800.00	7850.00	7900.00	7950.00	8000.00	8050.00	8100.00	8150.00	8200.00	8250.00	8300.00	8350.00	8400.00	8450.00	8500.00	8550.00	8600.00	8650.00	8700.00	8750.00	8800.00	8850.00	8900.00	8950.00	9000.00	9050.00	9100.00	9150.00	9200.00	9250.00	9300.00	9350.00	9400.00	9450.00	9500.00	9550.00	9600.00	9650.00	9700.00	9750.00	9800.00	9850.00	9900.00	9950.00	10000.00

Item	Price	Quantity	Total
1.00	1.00	1.00	1.00
2.00	2.00	2.00	2.00
3.00	3.00	3.00	3.00
4.00	4.00	4.00	4.00
5.00	5.00	5.00	5.00
6.00	6.00	6.00	6.00
7.00	7.00	7.00	7.00
8.00	8.00	8.00	8.00
9.00	9.00	9.00	9.00
10.00	10.00	10.00	10.00
11.00	11.00	11.00	11.00
12.00	12.00	12.00	12.00
13.00	13.00	13.00	13.00
14.00	14.00	14.00	14.00
15.00	15.00	15.00	15.00
16.00	16.00	16.00	16.00
17.00	17.00	17.00	17.00
18.00	18.00	18.00	18.00
19.00	19.00	19.00	19.00
20.00	20.00	20.00	20.00
21.00	21.00	21.00	21.00
22.00	22.00	22.00	22.00
23.00	23.00	23.00	23.00
24.00	24.00	24.00	24.00
25.00	25.00	25.00	25.00
26.00	26.00	26.00	26.00
27.00	27.00	27.00	27.00
28.00	28.00	28.00	28.00
29.00	29.00	29.00	29.00
30.00	30.00	30.00	30.00
31.00	31.00	31.00	31.00
32.00	32.00	32.00	32.00
33.00	33.00	33.00	33.00
34.00	34.00	34.00	34.00
35.00	35.00	35.00	35.00
36.00	36.00	36.00	36.00
37.00	37.00	37.00	37.00
38.00	38.00	38.00	38.00
39.00	39.00	39.00	39.00
40.00	40.00	40.00	40.00
41.00	41.00	41.00	41.00
42.00	42.00	42.00	42.00
43.00	43.00	43.00	43.00
44.00	44.00	44.00	44.00
45.00	45.00	45.00	45.00
46.00	46.00	46.00	46.00
47.00	47.00	47.00	47.00
48.00	48.00	48.00	48.00
49.00	49.00	49.00	49.00
50.00	50.00	50.00	50.00
51.00	51.00	51.00	51.00
52.00	52.00	52.00	52.00
53.00	53.00	53.00	53.00
54.00	54.00	54.00	54.00
55.00	55.00	55.00	55.00
56.00	56.00	56.00	56.00
57.00	57.00	57.00	57.00
58.00	58.00	58.00	58.00
59.00	59.00	59.00	59.00
60.00	60.00	60.00	60.00
61.00	61.00	61.00	61.00
62.00	62.00	62.00	62.00
63.00	63.00	63.00	63.00
64.00	64.00	64.00	64.00
65.00	65.00	65.00	65.00
66.00	66.00	66.00	66.00
67.00	67.00	67.00	67.00
68.00	68.00	68.00	68.00
69.00	69.00	69.00	69.00
70.00	70.00	70.00	70.00
71.00	71.00	71.00	71.00
72.00	72.00	72.00	72.00
73.00	73.00	73.00	73.00
74.00	74.00	74.00	74.00
75.00	75.00	75.00	75.00
76.00	76.00	76.00	76.00
77.00	77.00	77.00	77.00
78.00	78.00	78.00	78.00
79.00	79.00	79.00	79.00
80.00	80.00	80.00	80.00

227.78	360.42	440.95
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0.00	37.77	120.36	242.17
6202.39	3283.60	10774.93	13228.11

[illegible]

37.53	38.58	89.63	99.68
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-	0.00	37.77	120.36	242.17
600.18	3787.60	10774.93	13228.11	

6707.38	3263.80	10.77.73	19249.14
GE 16	78.7		

5132

ST. 3

	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2
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[illegible]

51 23.9

94.8 51 303 15

1935 25.4

1967 34.2

SI 300 96.8

82 45

SUR-AREA RUNOFF COMPUTATION

INFLOW TO SITE 6

ISTAR	ICOMP	IECON	ITAPE	JPLT	JFRT	INAME	ISTAGE	IAUTO
S-6	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYG	IUNG	ITAKEA	SNAP	IRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	2	11.71	0.00	32.99	0.00	0.000	0	1	0

PRECIP DATA

SFFE	FMS	R6	R12	R24	R48	R72	R96
0.00	23.20	101.00	110.00	120.00	132.00	0.00	0.00

TRSPC-COMPUTED BY THE PROGRAM IS .838

LOSS DATA

LEOPT	SINKR	DLINK	RIOL	ERAIN	STKS	RIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT-HYDROGRAPH DATA

TC= 0.00 LAG= 6.60

RECESSION DATA

STRTD= -1.50 ORCSN= .05 RTIOR= 2.00

END-OF-PERIOD-FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
0													
SUM	25.67	23.20	2.46	800207.			(.552.)	(.589.)	(.63.)	(22659.34)			

COMBINE HYDROGRAPHS

COMBINE RUNOFF TO SITE 6 WITH REACH 6 DISCHARGE

ISTAG	ICOMP	IECON	ITAPE	JPLT	JFRT	INAME	ISTAGE	IAUTO
S-6	2	0	0	0	0	1	0	0

SH 29

HYDROGRAPH ROUTING

OUTFLOW FROM SITE 6

ISTAD ICOMP IECON ITAPE JPLT JFRT INAME ISTAGE IAUOT
0-6 0 0 0 0 0 0 0 0

ROUTING DATA

QLOSS CLOSS AUG IRES ISAME IOFT IPMP LSTR
0.0 0.000 0.00 1 1 0 0 0

NSTFS NSTEL LAG AMSKK X TSK STORA ISFRAT
1 0 0 0.000 0.000 0.000 0.000 79.1

STAGE 79.30 82.00 85.50 87.00 88.50 92.00 94.00 96.00 98.00 102.00

FLOW 0.00 140.00 160.00 443.00 966.00 5777.00 9991.00 14952.00 21788.00 41863.00

CAPACITY= 150. 389. 984. 1399. 1902. 3608. 5022. 6759. 9461. 16256.

ELEVATION= 79. 82. 86. 87. 89. 92. 94. 96. 98. 102.

CREL SFWD COMW EXFW ELEV COOL CAREA EXFL
79.3 0.0 0.0 0.0 0.0 0.0 0.0 0.0

DAM DATA
TOREL COMW EXPD DAMWID
101.0 2.7 1.5 2680.

PEAK OUTFLOW IS 257. AT TIME 50.00 HOURS

PEAK OUTFLOW IS 453. AT TIME 50.00 HOURS

PEAK OUTFLOW IS 1371. AT TIME 50.00 HOURS

PEAK OUTFLOW IS 2539. AT TIME 50.00 HOURS

PEAK OUTFLOW IS 3700. AT TIME 50.00 HOURS

PEAK OUTFLOW IS 4947. AT TIME 50.00 HOURS

PEAK OUTFLOW IS 6199. AT TIME 50.00 HOURS

PEAK OUTFLOW IS 7456. AT TIME 50.00 HOURS

PEAK OUTFLOW IS 8690. AT TIME 50.00 HOURS

Sh 30

HYDROGRAPH ROUTING

OUTFLOW FROM SITE 6 ROUTED THROUGH REACH 7

ISTAG	ICOMP	IECON	ITAPE	JFLT	JFRT	INAME	ISTAGE	IAUTO
R-7	1	0	0	0	0	1	0	0
ROUTING DATA								
CLOSS	AVG	IPMP	IPMP	IPMP	IPMP	IPMP	IPMP	IPMP
0.0	0.000	0.00	1	1	0	0	0	0
NSTR								
1	0	0	0.000	0.000	0.000	-1.	0	0

NORMAL DEPTH CHANNEL ROUTING

Q(1)	Q(2)	Q(3)	ELWY	ELMAX	RLNTH	SEL
.0600	.0300	.0600	61.0	80.0	16500.	.00110

CROSS SECTION COORDINATES--STA+LEVELELEV+STA+ELEV--ETC

	0.00	80.00	350.00	70.00	700.00	64.00	703.00	61.00	718.00	61.00
	721.00	64.00	1350.00	70.00	2000.00	80.00				
STORAGE	0.00	6.06	12.88	20.45	59.31	159.97	322.44	546.72	833.80	1180.68
	1578.41	2014.02	2487.50	2998.86	3549.11	4135.23	4760.23	5423.11	6123.86	6862.50
OUTFLOW	0.00	24.52	78.08	154.96	310.24	673.04	1354.58	2446.76	4031.49	6184.06
	9154.72	12767.56	17016.76	21938.66	27560.67	33910.65	41016.63	48906.57	57608.29	67149.36
STAGE	61.00	62.00	63.00	64.00	65.00	66.00	67.00	68.00	69.00	70.00
	71.00	72.00	73.00	74.00	75.00	76.00	77.00	78.00	79.00	80.00
FLOW	9.00	24.52	78.08	154.96	310.24	673.04	1354.58	2446.76	4031.49	6184.06
	9164.72	12767.56	17016.76	21938.66	27560.67	33910.65	41016.63	48906.57	57608.29	67149.36

MAXIMUM STAGE IS 64.2

MAXIMUM STAGE IS 65.2

MAXIMUM STAGE IS 66.1

MAXIMUM STAGE IS 67.1

MAXIMUM STAGE IS 68.0

MAXIMUM STAGE IS 68.7

MAXIMUM STAGE IS 69.3

MAXIMUM STAGE IS 69.9

MAXIMUM STAGE IS 70.3

SH 31

SUR-AREA RUNOFF COMPUTATION

INFLOW TO SITE 20

ISTAQ 9-20 ICOMP 0 IECON 0 ITAPE 0 JPLT 0 JFRT 0 INAME 1 ISTAGE 0 IAUTO 0

HYDROGRAPH DATA

INYDG 1 IUNG 2 TAREA 10.96 SNAP 0.00 TRSDA 32.99 RATIO 0.000 ISNOW 0 ISAME 1 LOCAL 0

PRECIP DATA

SFFE 0.00 FMS 23.20 R6 101.00 R12 110.00 R24 120.00 R48 132.00 R72 0.00 R96 0.00

TRSPC COMPUTED BY THE PROGRAM IS -838

LOSS DATA

LROFT 0 STKR 0.00 DTKR 1.00 ERIN 0.00 STRNS 1.00 RTIOK 1.00 STRTL 1.00 CNSTL 0.05 ALSMX 0.00 RTIMP 0.00

UNIT HYDROGRAPH DATA

TC= 0.00 LAG= 4.14

RECESSION DATA

STRTO= -1.50 ORCEN= -0.05 RTIOR= 2.00

END-OF-PERIOD FLOW

MO.DA HR.MN PERIOD RAIN EXCS LOSS COMP Q MO.DA HR.MN PERIOD RAIN EXCS LOSS COMP Q

SUM 25.67 23.20 2.46 920056.
(652.) (589.) (63.) (26053.08)

COMBINE HYDROGRAPHS

COMBINE SITE 6 DISCHARGE WITH RUNOFF TO SITE 20

ISTAQ 5-20 ICOMP 2 IECON 0 ITAPE 0 JPLT 0 JFRT 0 INAME 1 ISTAGE 0 IAUTO 0

HYDROGRAPH ROUTING

OUTFLOW FROM SITE 20

ISTAQ 0-20 ICOMP 1 IECON 0 ITAPE 0 JPLT 0 JFRT 0 INAME 1 ISTAGE 0 IAUTO 0

ROUTING DATA

QLOSS 0.0 CLOSS 0.000 AUG 0.00 IRES 1 ISAME 1 IOFT 0 IFMP 0 LSTR 0

WSTFS 1 NSTOL 0 LAG 0.000 AMSKK X TSK STORA ISPRAT -54.1

SH 32

STAGE	64.00	64.80	65.60	66.50	67.00	67.50	68.00	69.25	70.00	72.00
	74.00	76.00	78.00							
FLOW	0.00	53.00	150.00	238.00	328.00	504.00	735.00	1490.00	2466.00	6777.00
	12621.00	19433.00	27000.00							

CAPACITY= 2700. 3412. 4837. 14732.

ELEVATION= 64. 67. 69. 78.

CREL	SPWID	COBW	EXPW	ELEV	COOL	CAREA	EXPL
64.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COOD	EXPD	DAMWID
78.0	0.0	0.0	0.

PEAK OUTFLOW IS 449. AT TIME 50.00 HOURS

PEAK OUTFLOW IS 893. AT TIME 50.00 HOURS

PEAK OUTFLOW IS 1406. AT TIME 50.00 HOURS

PEAK OUTFLOW IS 1959. AT TIME 50.00 HOURS

PEAK OUTFLOW IS 2628. AT TIME 50.00 HOURS

PEAK OUTFLOW IS 3579. AT TIME 50.00 HOURS

PEAK OUTFLOW IS 4533. AT TIME 50.00 HOURS

PEAK OUTFLOW IS 5515. AT TIME 50.00 HOURS

PEAK OUTFLOW IS 6527. AT TIME 50.00 HOURS

1

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
 FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
 AREA IN SQUARE MILES (SQUARE KILOMETERS)

9433

RATIOS APPLIED TO FLOWS

OPERATION	STATION	AREA	FLAN	RATIO 1	RATIO 2	RATIO 3	RATIO 4	RATIO 5	RATIO 6	RATIO 7	RATIO 8	RATIO 9
				.10	.15	.20	.25	.30	.35	.40	.45	.50
HYDROGRAPH AT	S-18	1.21 (3.13)	1	483. (-13.67)	724. (20.51)	966. (27.34)	1207. (34.18)	1448. (41.02)	1690. (47.85)	1931. (54.69)	2173. (61.52)	2414. (68.36)
ROUTED TO	D-18	1.21 (3.13)	1	18. (.52)	88. (2.50)	266. (7.53)	448. (12.70)	624. (17.68)	833. (23.58)	1031. (29.19)	1238. (35.07)	1583. (44.82)
ROUTED TO	R-1	1.21 (3.13)	1	18. (.51)	83. (2.36)	255. (7.22)	404. (11.35)	551. (15.61)	719. (20.37)	885. (25.07)	1049. (29.69)	1216. (34.42)
HYDROGRAPH AT	S-19	1.77 (4.58)	1	553. (-15.66)	829. (-23.49)	1106. (31.31)	1362. (39.14)	1659. (46.97)	1935. (54.80)	2212. (62.63)	2488. (70.46)	2765. (78.29)
ROUTED TO	D-19	1.77 (4.58)	1	17. (.48)	80. (2.26)	173. (4.91)	326. (9.22)	546. (15.47)	770. (21.80)	1019. (28.86)	1255. (35.55)	1492. (42.25)
ROUTED TO	R-2	1.77 (4.58)	1	17. (.48)	80. (2.26)	173. (4.89)	325. (9.20)	540. (15.30)	759. (21.50)	1005. (28.46)	1240. (35.10)	1476. (41.78)
2 COMBINED	R-3	2.98 (7.72)	1	35. (.99)	160. (4.52)	396. (11.22)	711. (20.12)	1072. (30.36)	1450. (41.06)	1862. (52.73)	2260. (63.99)	2655. (75.18)
ROUTED TO	R-3	2.98 (7.72)	1	35. (.99)	158. (4.48)	382. (10.81)	688. (19.48)	1040. (29.46)	1412. (39.97)	1814. (51.38)	2207. (62.48)	2595. (73.48)
HYDROGRAPH AT	S-4	5.98 (15.49)	1	1120. (-31.71)	1680. (47.57)	2240. (63.42)	2800. (79.28)	3360. (95.14)	3920. (110.99)	4480. (126.85)	5040. (142.71)	5600. (158.56)
2 COMBINED	S-4	8.96 (23.21)	1	1146. (-32.45)	1821. (51.57)	2604. (73.75)	3467. (98.18)	4381. (124.06)	5325. (150.79)	6294. (178.23)	7242. (205.07)	8184. (231.74)
ROUTED TO	D-4	8.96 (23.21)	1	77. (2.19)	184. (5.22)	517. (14.65)	1066. (30.18)	1719. (48.68)	2514. (71.19)	3274. (92.90)	4016. (113.71)	4812. (136.27)
ROUTED TO	R-4	8.96 (23.21)	1	76. (2.15)	176. (4.99)	469. (13.27)	1038. (27.39)	1657. (46.91)	2422. (68.58)	3175. (99.71)	3904. (110.54)	4672. (132.30)
HYDROGRAPH AT	S-5	1.36 (3.52)	1	416. (-11.77)	624. (17.66)	831. (23.54)	1039. (29.43)	1247. (35.32)	1455. (41.20)	1663. (47.09)	1871. (52.97)	2079. (58.86)
ROUTED TO	D-5	1.36 (3.52)	1	12. (.34)	24. (.68)	35. (.98)	58. (1.63)	101. (2.86)	177. (5.00)	253. (7.16)	329. (9.33)	413. (11.70)
ROUTED TO	R-5	1.36 (3.52)	1	12. (.34)	24. (.67)	35. (.98)	57. (1.63)	101. (2.85)	176. (4.98)	249. (7.06)	324. (9.18)	405. (11.46)
2 COMBINED	R-6	10.32 (26.73)	1	88. (2.50)	200. (5.67)	503. (14.24)	1092. (30.92)	1751. (49.60)	2574. (72.90)	3398. (96.23)	4195. (118.80)	5040. (142.71)
ROUTED TO	R-6	10.32 (26.73)	1	87. (2.46)	198. (5.60)	471. (13.34)	1076. (30.47)	1731. (49.01)	2547. (72.11)	3364. (95.24)	4157. (117.71)	4988. (141.25)
HYDROGRAPH AT	S-6	11.71 (30.33)	1	1567. (-44.38)	2351. (66.57)	3134. (88.76)	3918. (110.94)	4702. (133.13)	5485. (155.32)	6269. (177.51)	7052. (199.70)	7836. (221.97)
2 COMBINED	S-6	22.03 (57.06)	1	1627. (46.07)	2465. (69.79)	3353. (94.93)	4413. (124.95)	5781. (163.69)	7476. (211.71)	9171. (259.71)	10845. (307.09)	12533. (354.91)

SH 31

ROUTED TO	D-6	22.03	1	257.	653.	1371.	2539.	3700.	4947.	6199.	7456.	8690.
		(57.06)		(7.29)	(18.50)	(38.82)	(71.89)	(104.76)	(140.10)	(175.54)	(211.12)	(246.08)
ROUTED TO	R-7	22.03	1	181.	384.	721.	1474.	2408.	3520.	4684.	5878.	7194.
		(57.06)		(5.13)	(10.87)	(20.42)	(41.73)	(68.19)	(99.66)	(132.63)	(166.44)	(203.72)
HYDROGRAPH AT	S-20	10.96	1	2033.	3050.	4067.	5083.	6100.	7117.	8133.	9150.	10167.
		(28.39)		(57.59)	(86.37)	(115.16)	(143.95)	(172.74)	(201.53)	(230.31)	(259.10)	(287.89)
2 COMBINED	S-20	32.99	1	2154.	3188.	4212.	5234.	6262.	7305.	8362.	9434.	10513.
		(85.44)		(61.00)	(90.27)	(119.28)	(148.22)	(177.31)	(206.85)	(236.79)	(267.13)	(297.69)
ROUTED TO	D-20	32.99	1	449.	893.	1406.	1959.	2628.	3579.	4533.	5515.	6527.
		(95.44)		(12.72)	(25.30)	(39.81)	(55.47)	(74.43)	(101.35)	(128.37)	(156.16)	(184.81)

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1	ELEVATION	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
		STORAGE	172.00	172.00	179.50
		OUTFLOW	346.	346.	732.
			0.	0.	1342.

RATIO	MAXIMUM	MAXIMUM	MAXIMUM	DURATION	TIME OF	TIME OF
OF	RESERVOIR	DEPTH	MAXIMUM	OVER-TOP	MAX-OUTFLOW	FAILURE
FMF	W.S.ELEV	OVER DAM	STORAGE	AC-FT	OUTFLOW	HOURS
.10	175.11	0.00	484.	18.	0.00	44.83
.15	176.27	0.00	543.	88.	0.00	43.50
.20	176.94	0.00	583.	266.	0.00	42.83
.25	177.50	0.00	615.	448.	0.00	42.50
.30	178.02	0.00	645.	624.	0.00	42.17
.35	178.47	0.00	672.	833.	0.00	41.83
.40	178.90	0.00	697.	1031.	0.00	41.67
.45	179.30	0.00	721.	1238.	0.00	41.50
.50	179.63	.13	739.	1583.	1.00	41.33

PLAN 1 STATION R-1

RATIO	MAXIMUM	MAXIMUM	TIME
FLOW, CFS	STAGE, FT	HOURS	
.10	18.	110.4	46.83
.15	93.	111.5	44.00
.20	255.	113.0	43.17
.25	401.	113.5	43.33
.30	571.	114.0	43.17
.35	719.	114.4	43.00
.40	885.	114.6	42.83
.45	1049.	114.8	42.67
.50	1216.	115.1	42.50

SUMMARY OF DAM SAFETY ANALYSIS

SH 35

PLAN 1

ELEVATION STORAGE
OUTFLOW

INITIAL VALUE 155.90
462.
0.

SPILLWAY CREST 155.90
462.
0.

TOP OF DAM 164.90
1185.
1746.

RATIO OF FPM	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	159.10	0.00	669.	17.	0.00	48.33	0.00
.15	160.30	0.00	754.	80.	0.00	45.17	0.00
.20	161.16	0.00	837.	173.	0.00	44.50	0.00
.25	161.86	0.00	905.	326.	0.00	44.00	0.00
.30	162.50	0.00	963.	546.	0.00	43.67	0.00
.35	163.06	0.00	1014.	770.	0.00	43.33	0.00
.40	163.57	0.00	1059.	1019.	0.00	43.17	0.00
.45	164.04	0.00	1101.	1255.	0.00	43.00	0.00
.50	164.46	0.00	1142.	1492.	0.00	42.83	0.00

PLAN 1 STATION R-2

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.10	17.	110.3	48.67
.15	80.	111.2	45.33
.20	173.	112.0	44.67
.25	325.	112.9	44.17
.30	540.	113.7	44.00
.35	759.	114.4	43.67
.40	1005.	114.9	43.50
.45	1240.	115.3	43.33
.50	1476.	115.6	43.17

PLAN 1 STATION R-3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.10	35.	108.3	48.67
.15	158.	110.1	44.67
.20	382.	111.4	44.33
.25	688.	112.3	44.33
.30	1040.	112.9	44.17
.35	1412.	113.5	43.83
.40	1814.	113.9	43.67
.45	2207.	114.3	43.50
.50	2595.	114.7	43.33

SUMMARY OF DAM SAFETY ANALYSIS

SH 36

PLAN 1

INITIAL VALUE SPILLWAY CREST TOP OF DAM
 110.00 110.00 118.70
 ELEVATION STORAGE 1158. 4283.
 0. 6896.
 OUTFLOW

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	112.45	0.00	1828.	77.	0.00	50.00	0.00
.15	113.54	0.00	2203.	184.	0.00	50.00	0.00
.20	114.46	0.00	2556.	517.	0.00	50.00	0.00
.25	115.10	0.00	2818.	1066.	0.00	48.83	0.00
.30	115.70	0.00	3065.	1719.	0.00	47.83	0.00
.35	116.22	0.00	3276.	2514.	0.00	47.17	0.00
.40	116.71	0.00	3477.	3274.	0.00	46.83	0.00
.45	117.19	0.00	3674.	4016.	0.00	46.50	0.00
.50	117.66	0.00	3864.	4812.	0.00	46.33	0.00

PLAN 1 STATION R-4

RATIO	MAXIMUM FLOW-CFS	MAXIMUM STAGE-FT	TIME HOURS
.10	76.	91.9	50.00
.15	176.	93.2	50.00
.20	469.	94.5	50.00
.25	1038.	95.7	50.00
.30	1657.	96.5	48.83
.35	2422.	97.2	48.17
.40	3175.	97.7	47.67
.45	3904.	98.2	47.33
.50	4672.	98.6	47.00

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1

INITIAL VALUE SPILLWAY CREST TOP OF DAM
 102.70 102.70 110.00
 ELEVATION STORAGE 110. 1180.
 0. 971.
 OUTFLOW

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	104.83	0.00	268.	12.	0.00	48.83	0.00
.15	105.50	0.00	344.	24.	0.00	47.33	0.00
.20	106.08	0.00	421.	35.	0.00	47.17	0.00
.25	106.56	0.00	495.	58.	0.00	46.33	0.00
.30	106.96	0.00	563.	101.	0.00	45.67	0.00
.35	107.34	0.00	625.	177.	0.00	45.00	0.00
.40	107.69	0.00	684.	253.	0.00	44.67	0.00
.45	108.04	0.00	743.	327.	0.00	44.50	0.00
.50	108.29	0.00	800.	413.	0.00	44.33	0.00

Sh 37

PLAN 1 STATION R-5

RATIO	MAXIMUM FLOW, CFS	MAXIMUM STAGE, FT	TIME HOURS
.10	12.	90.4	49.50
.15	24.	90.8	48.67
.20	35.	91.1	47.50
.25	57.	91.5	46.83
.30	101.	92.2	46.00
.35	176.	93.0	45.33
.40	249.	93.5	45.33
.45	324.	94.0	45.17
.50	405.	94.4	45.17

PLAN 1 STATION R-6

RATIO	MAXIMUM FLOW, CFS	MAXIMUM STAGE, FT	TIME HOURS
.10	87.	78.7	50.00
.15	198.	79.8	50.00
.20	471.	81.3	50.00
.25	1076.	82.8	50.00
.30	1731.	83.9	49.33
.35	2547.	84.8	48.67
.40	3364.	85.6	48.17
.45	4157.	86.2	47.83
.50	4988.	86.8	47.50

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	79.30	79.30	101.00
STORAGE	150.	150.	14557.
OUTFLOW	0.	0.	36844.

RATIO OF PMF	MAXIMUM RESERVOIR W.S. ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	36.01	0.00	1126.	257.	0.00	50.00	0.00
.15	87.60	0.00	1601.	653.	0.00	50.00	0.00
.20	88.79	0.00	2046.	1371.	0.00	50.00	0.00
.25	89.64	0.00	2460.	2539.	0.00	50.00	0.00
.30	90.49	0.00	2871.	3700.	0.00	50.00	0.00
.35	91.40	0.00	3314.	4947.	0.00	50.00	0.00
.40	92.20	0.00	3750.	6199.	0.00	50.00	0.00
.45	92.80	0.00	4171.	7456.	0.00	50.00	0.00
.50	93.38	0.00	4586.	8690.	0.00	50.00	0.00

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PLAN 1 STATION R-7

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.10	181.	64.2	50.00
.15	384.	65.2	50.00
.20	721.	66.1	50.00
.25	1474.	67.1	50.00
.30	2408.	68.0	50.00
.35	3520.	68.7	50.00
.40	4684.	69.3	50.00
.45	5878.	69.9	50.00
.50	7194.	70.3	50.00

SUMMARY OF DAM SAFETY ANALYSIS

INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
64.00	64.00	78.00
2700.	2700.	14732.
0.	0.	27000.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	67.34	0.00	3850.	449.	0.00	50.00	0.00
.15	68.26	0.00	4325.	893.	0.00	50.00	0.00
.20	69.11	0.00	4765.	1406.	0.00	50.00	0.00
.25	69.61	0.00	5244.	1959.	0.00	50.00	0.00
.30	70.08	0.00	5770.	2628.	0.00	50.00	0.00
.35	70.52	0.00	6269.	3579.	0.00	50.00	0.00
.40	70.96	0.00	6797.	4533.	0.00	50.00	0.00
.45	71.41	0.00	7285.	5515.	0.00	50.00	0.00
.50	71.88	0.00	7816.	6527.	0.00	50.00	0.00

9439

APPENDIX

D

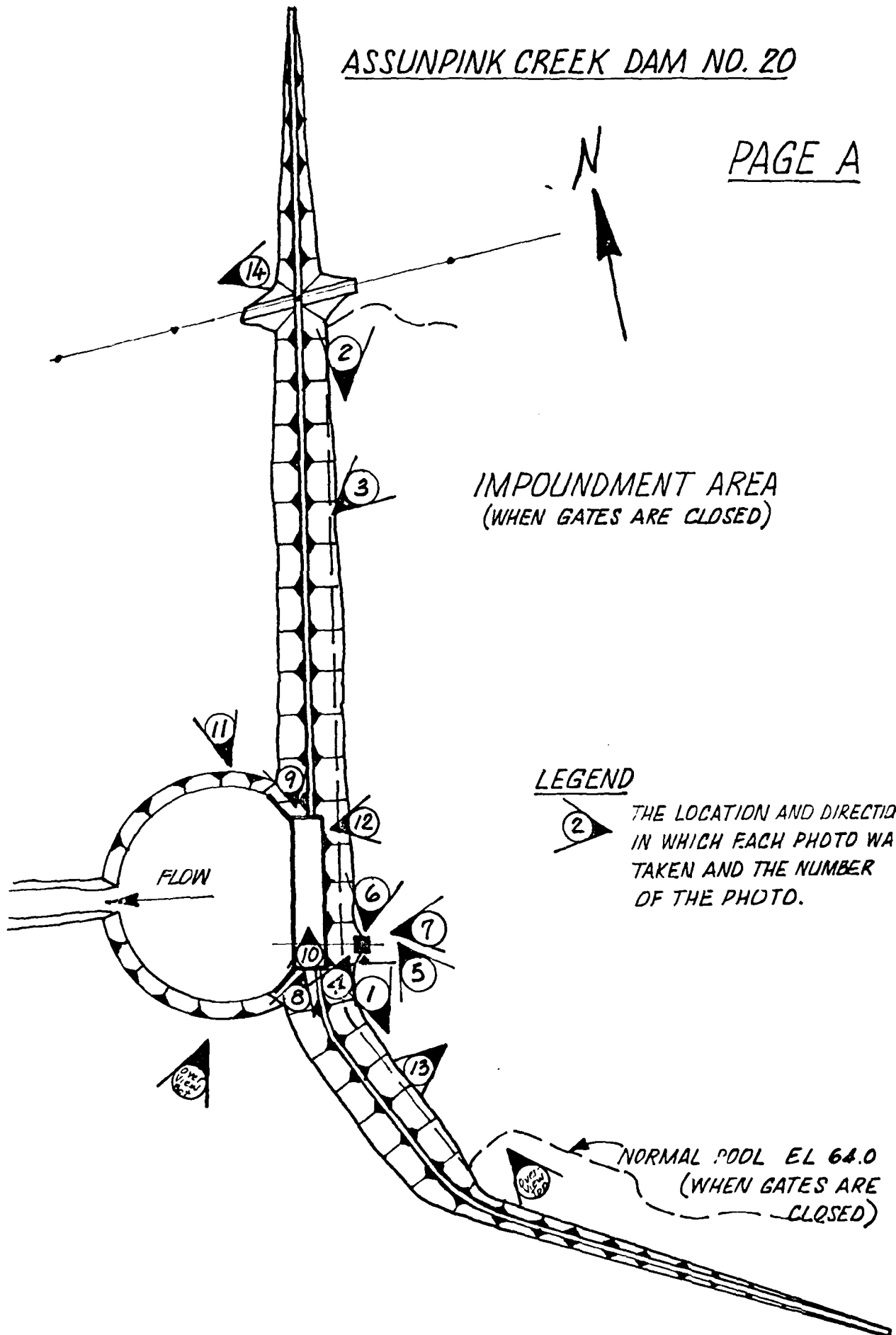
Photographs

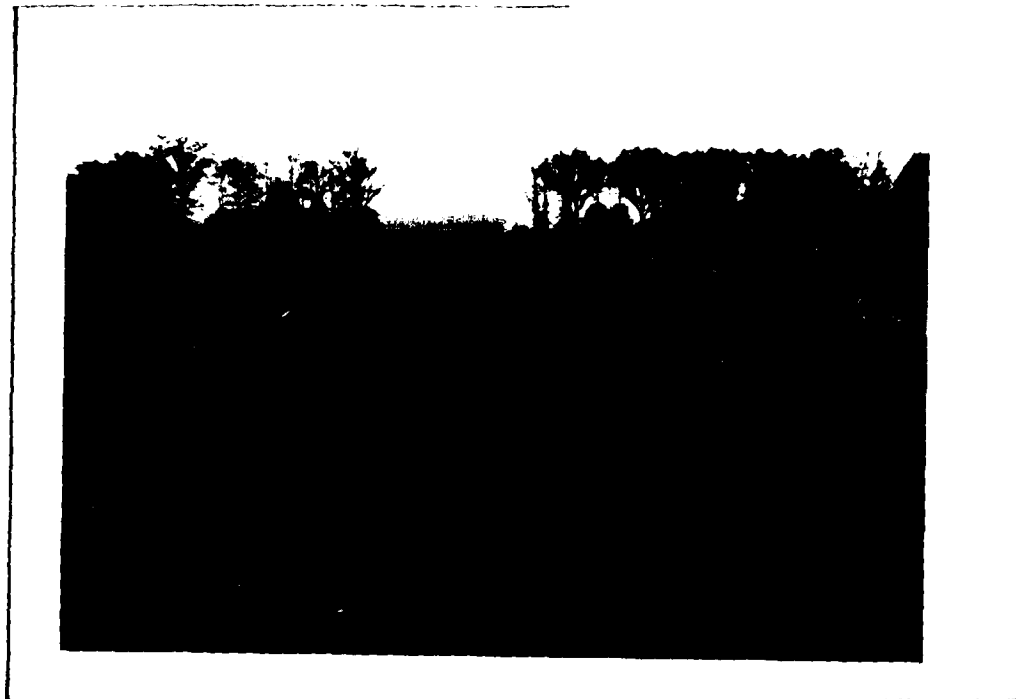
APPENDIX D
SELECTED PHOTOGRAPHS OF THE SITE

	<u>Page No.</u>
Site Plan	A
<u>PHOTOGRAPH NO.</u>	
1. View along the upstream face of the dam as seen from the left side of the spillway. (5/6/81)	1
2. View along the centerline of the dam towards the spillway in the background. (5/6/81)	1
3. Typical riprap on the upstream face of the dam. (5/6/81)	2
4. Principal spillway riser at the upstream toe of the dam. (5/6/81)	2
5. Left side of the principal spillway riser showing a 2-foot high by 4-foot wide gate in the fully open position. (5/6/81)	3
6. Right side of the principal spillway riser showing a 2-foot high by 4-foot wide gate in the fully open position. (5/6/81)	3
7. Upstream view of the riser showing the 4-foot diameter reservoir drain gate in the fully open position. (5/6/81)	4
8. View along the two stage 340-foot long drop spillway as observed from the left sidewall. (5/6/81)	4
9. View of the complete spillway system. (5/6/81)	5
10. Detailed view of the drop spillway. (5/6/81)	5
11. Looking upstream at the drop spillway from the downstream right side. (5/6/81)	6
12. Example of undermining at the junction of the earth embankment and the grouted riprap 23 feet upstream of the drop spillway headwall. (5/6/81)	6
13. Present extent of the impoundment with the reservoir drain fully open. (5/6/81)	7
14. Power line which passes over the dam about 750 feet left of the right abutment. (5/6/81)	7
15. Potential hazard area about 0.5 miles downstream of Assunpink Site 20.	8
16. Potential hazard area about 1.5 miles downstream of Assunpink Site 20.	8

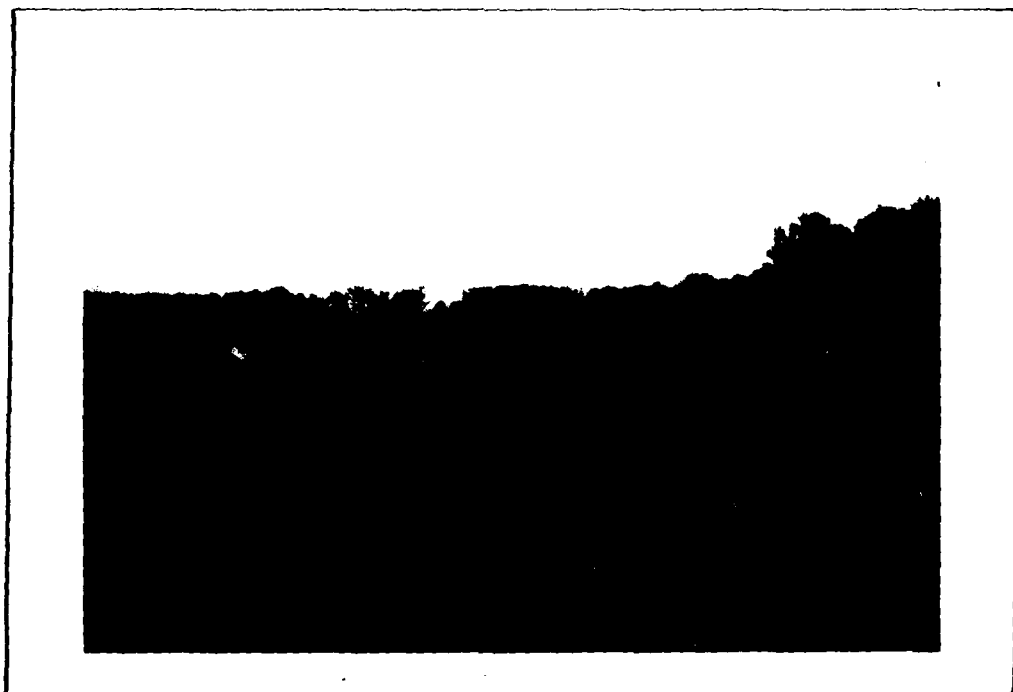
ASSUNPINK CREEK DAM NO. 20

PAGE A





1. VIEW ALONG THE UPSTREAM FACE OF THE DAM AS SEEN FROM THE LEFT SIDE OF THE SPILLWAY. (5/6/81)



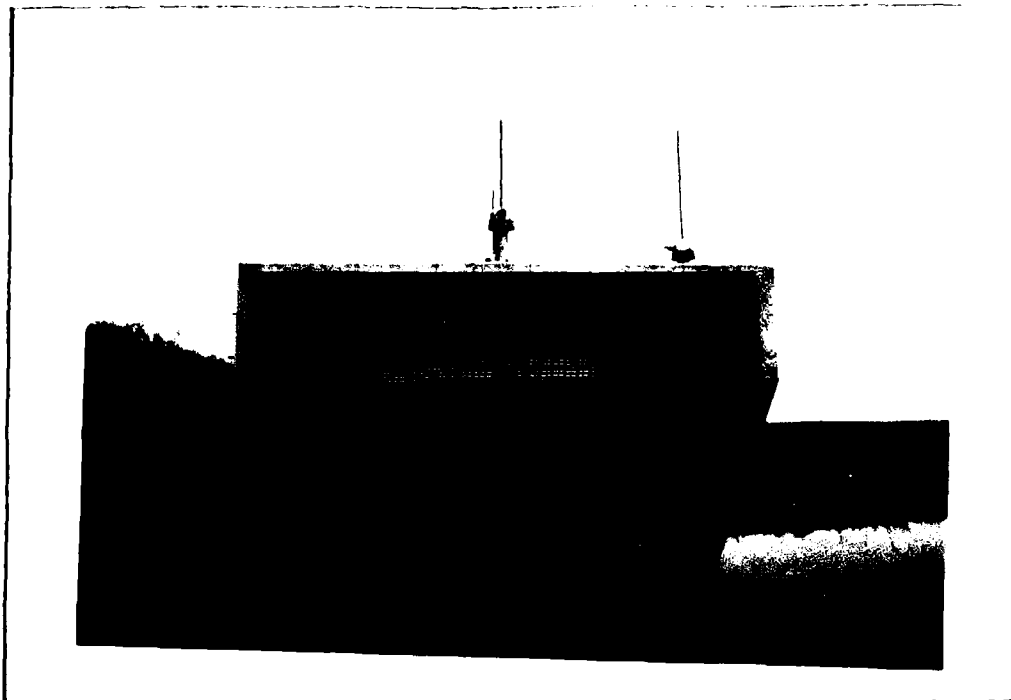
2. VIEW ALONG THE CENTERLINE OF THE DAM TOWARDS THE SPILLWAY IN THE BACKGROUND. (5/6/81)



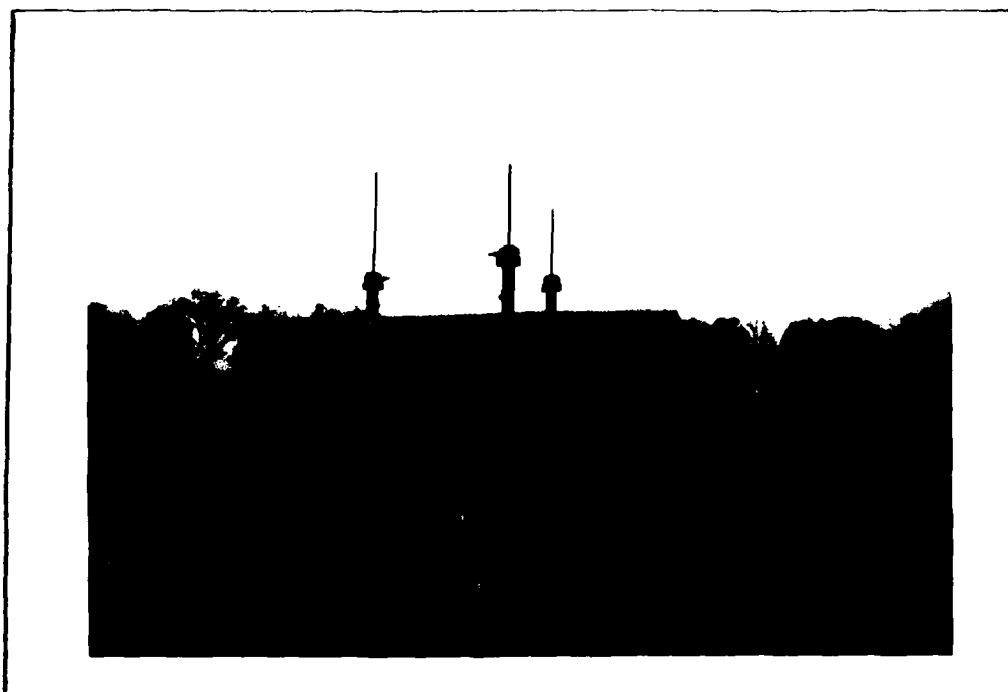
3. TYPICAL RIPRAP ON THE UPSTREAM FACE OF THE DAM. (5/6/81)



4. PRINCIPAL SPILLWAY RISER AT THE UPSTREAM TOE OF THE DAM.
(5/6/81)



5. LEFT SIDE OF THE PRINCIPAL SPILLWAY RISER SHOWING A 2-FOOT HIGH BY 4-FOOT WIDE GATE IN THE FULLY OPEN POSITION. (5/6/81)



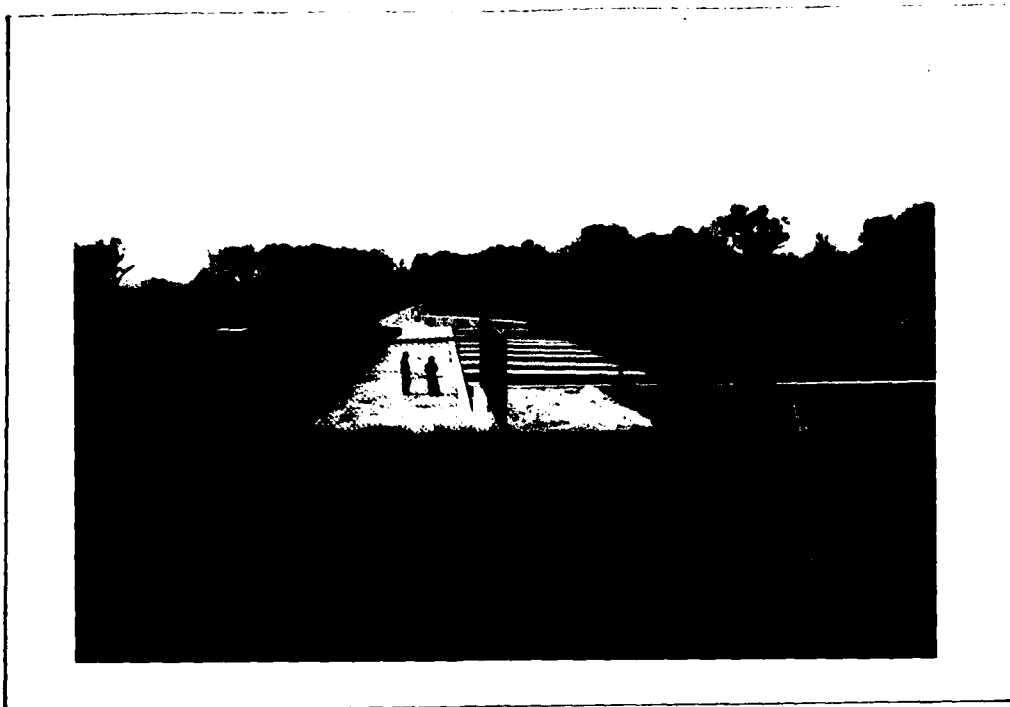
6. RIGHT SIDE OF THE PRINCIPAL SPILLWAY RISER SHOWING A 2-FOOT HIGH BY 4-FOOT WIDE GATE IN THE FULLY OPEN POSITION. (5/6/81)



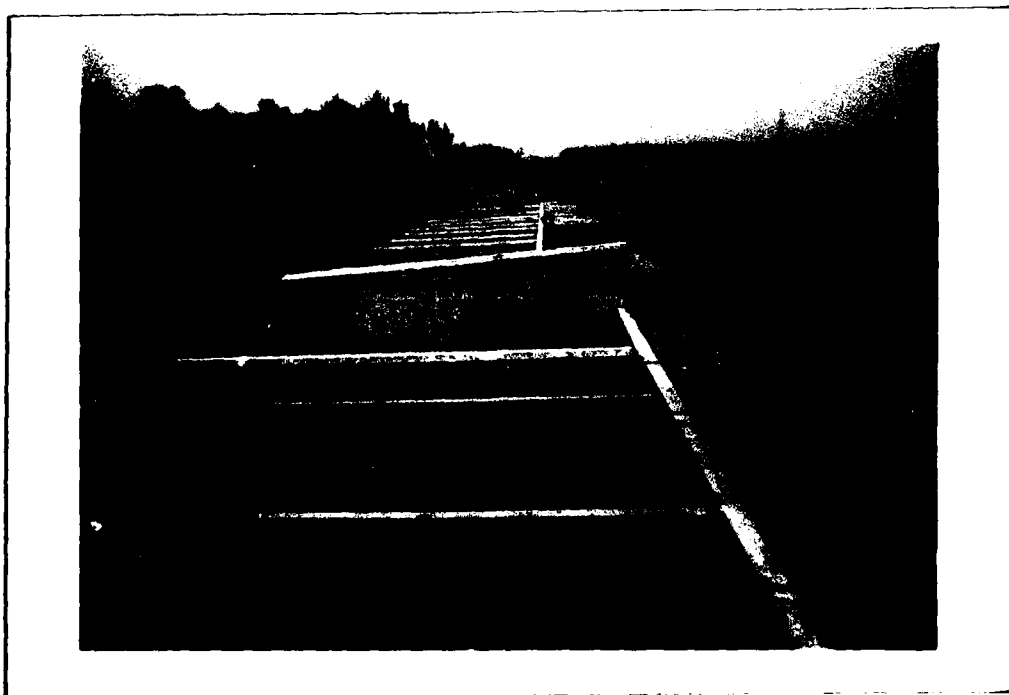
7. UPSTREAM VIEW OF THE RISER SHOWING THE 4-FOOT DIAMETER RESER-
VOIR DRAIN GATE IN THE FULLY OPEN POSITION. (5/6/81)



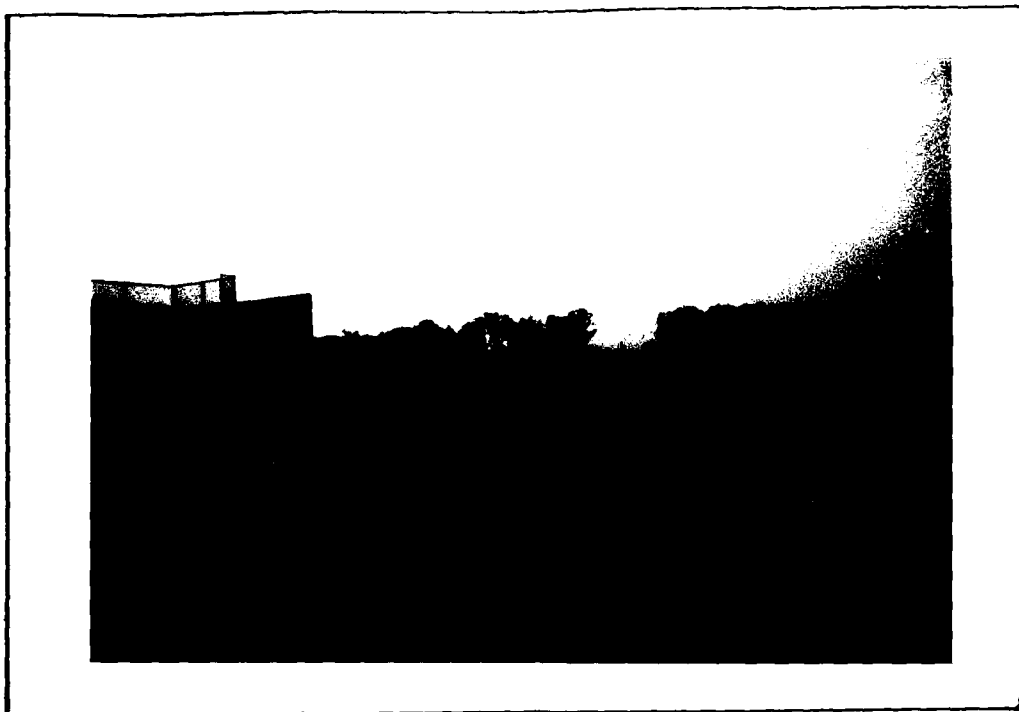
8. VIEW ALONG THE TWO STAGE 340-FOOT LONG DROP SPILLWAY AS OB-
SERVED FROM THE LEFT SIDEWALL. (5/6/81)



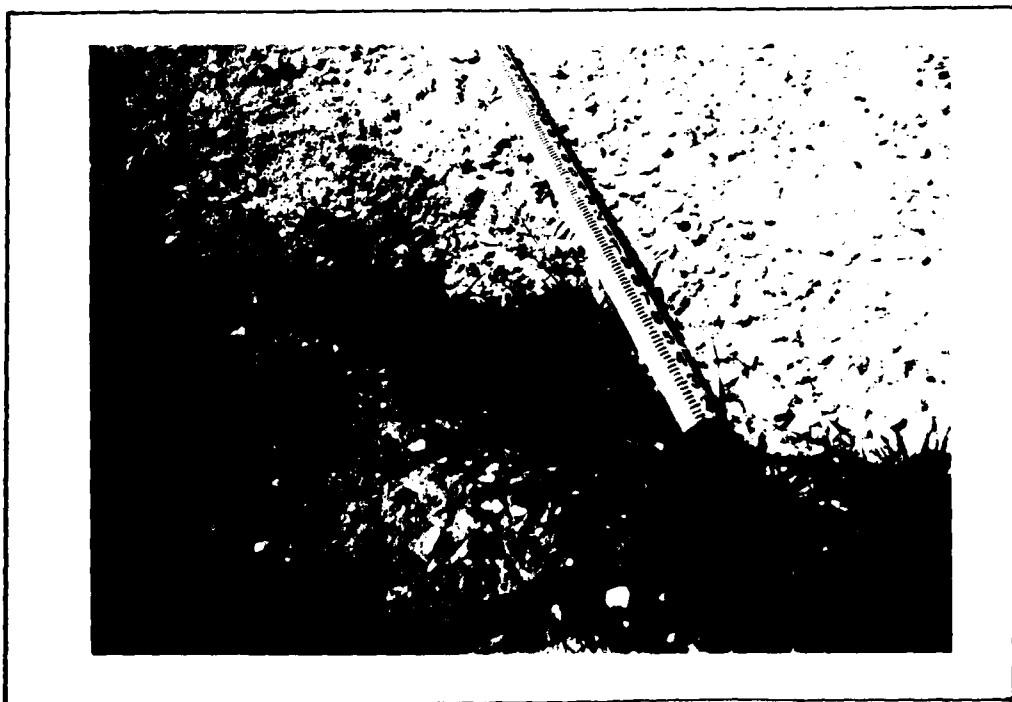
9. VIEW OF THE COMPLETE SPILLWAY SYSTEM. (5/6/81)



10. DETAILED VIEW OF THE DROP SPILLWAY. (5/6/81)



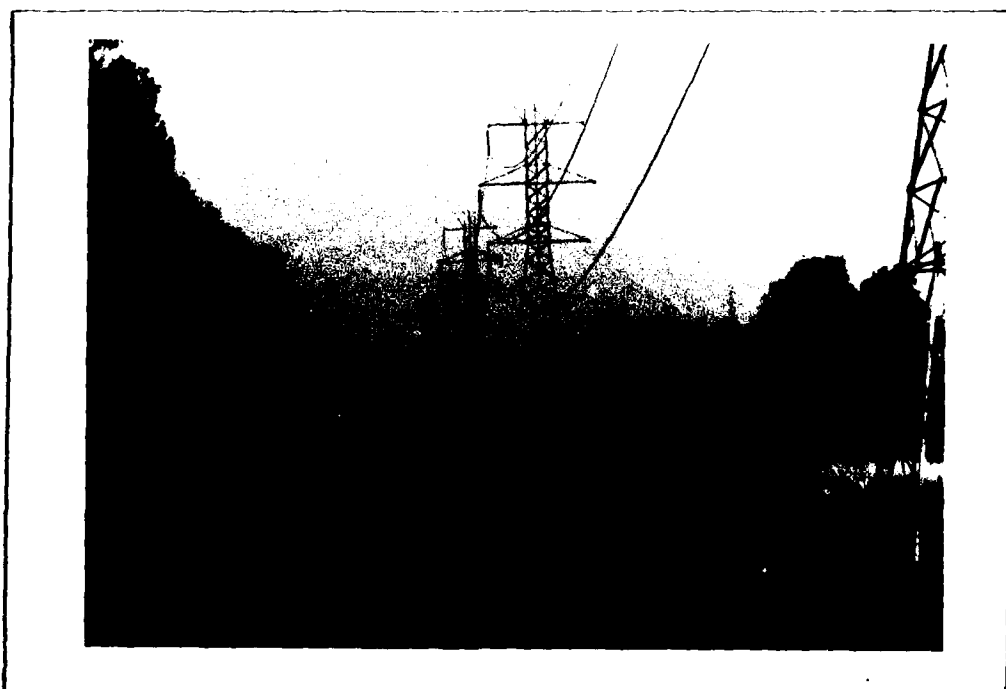
11. LOOKING UPSTREAM AT THE DROP SPILLWAY FROM THE DOWNSTREAM RIGHT SIDE. (5/6/81)



12. EXAMPLE OF UNDERMINING AT THE JUNCTION OF THE EARTH EMBANKMENT AND THE GROUTED RIPRAP 23 FEET UPSTREAM OF THE DROP SPILLWAY HEADWALL. (5/6/81)



13. PRESENT EXTENT OF THE IMPOUNDMENT WITH THE RESERVOIR DRAIN FULLY OPEN. (5/6/81)



14. POWER LINE WHICH PASSES OVER THE DAM ABOUT 750 FEET LEFT OF THE RIGHT ABUTMENT. (5/6/81)



15. POTENTIAL HAZARD AREA ABOUT 0.5 MILES DOWNSTREAM OF ASSUNPINK SITE 20.



16. POTENTIAL HAZARD AREA ABOUT 1.5 MILES DOWNSTREAM OF ASSUNPINK SITE 20.

APPENDIX

E

Drawings

AD-A103 501

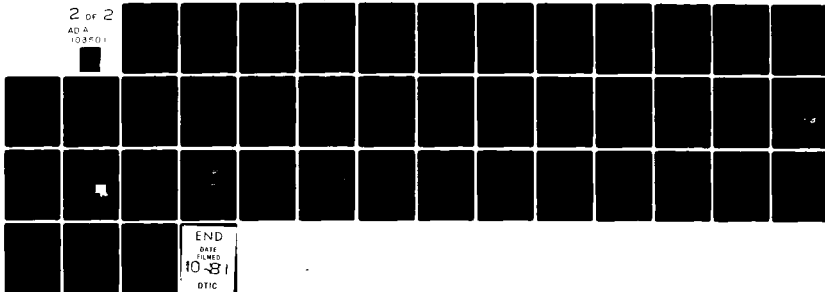
NEW JERSEY DEPT OF ENVIRONMENTAL PROTECTION TRENTON --ETC F/6 13/13
NATIONAL DAM SAFETY PROGRAM. ASSUNPINK CREEK DAM NUMBER 20 (NJ0--ETC(U)
AUG 81 J J WILLIAMS DACW61-79-C-0011

UNCLASSIFIED

DAEN/NAP-53842/NJ00552-81/ NL

2 OF 2

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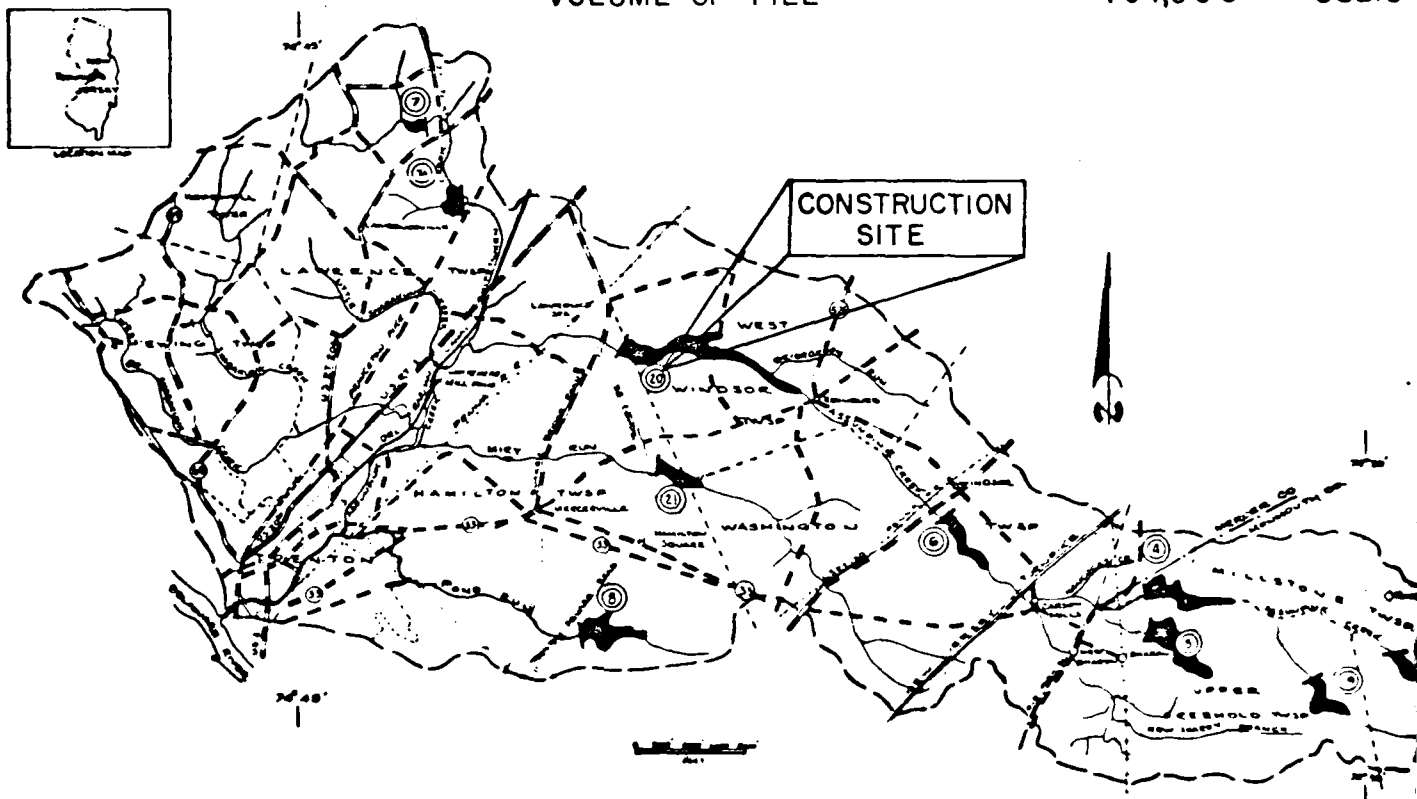
ASSUNPINK CREEK DAM NO. 20
APPENDIX E
DRAWINGS

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Regional Vicinity Map, Figure 1	1
Cover Sheet, Site 20 Drawings	2
Plan of Reservoir	3
Plan of Dam	4
Plan and Profile of Dam	5
Typical Sections and Zoning	6
Typical Sections and Zoning	7
Principal Spillway	8
Riser Structural Details	9
High Stage Trashrack and Riser Accessories	10
Conduit Details	11
Structural Drainage Details	12
Structural Details	13 & 14
Plan of Structure	15
Articulate Joint Details & Location	16
Structural Details	17 through 20

ASSUNPINK CREEK WATERSHED PROJECT SITE 20 MERCER & MONMOUTH COUNTIES, NEW JERSEY

DRAINAGE AREA	33	SQ. MI.
NORMAL STORAGE	2700	ACRE FEET
FLOODWATER RETARDING STORAGE TO EMERGENCY SPILLWAY CREST	2100	ACRE FEET
WATER SURFACE AREA AT NORMAL POOL	275	ACRES
HEIGHT OF DAM	25.6	FEET
VOLUME OF FILL	191,500	CUBIC YARDS



BUILT UNDER THE WATERSHED PROTECTION & FLOOD PREVENTION ACT

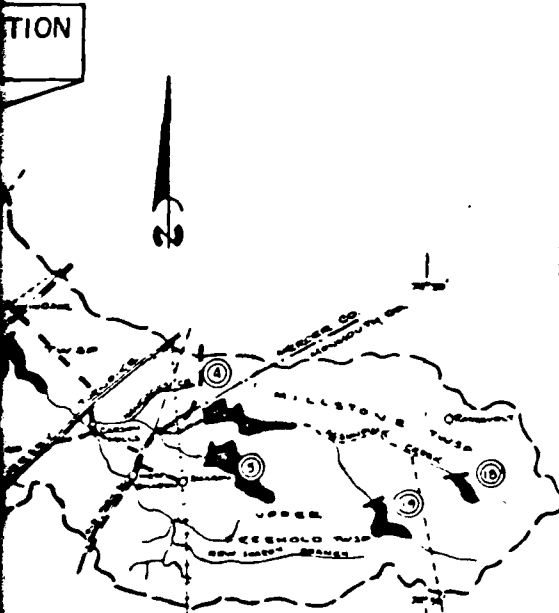
BY
MERCER COUNTY SOIL CONSERVATION DISTRICT
FREEHOLD SOIL CONSERVATION DISTRICT
MERCER COUNTY
MONMOUTH COUNTY
NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION
HAMILTON TOWNSHIP
UPPER FREEHOLD TOWNSHIP
ASSISTED BY
UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FOREST SERVICE

WATERSHED PROJECT 20 COUNTIES, NEW JERSEY

STORAGE

33	SQ. MI.
2700	ACRE FT.
2100	ACRE FT.
275	ACRES
25.6	FEET
191,500	CUBIC YDS.

SHEET NO.	INDEX
1	COVER SHEET
2,3,4	PLAN OF RESERVOIR
5	PLAN OF DAM (EARTH EMBANKMENT)
6	PLAN & PROFILE, J.C.P. & L. CO., R.O.W.
7	PLAN & PROFILE OF DAM (Shipping, Foundation Excavation, Culvert, Trench)
8,9	TYPICAL EMBANKMENT SECTIONS & ZONING
10	PLAN OF OUTLET CHANNEL
11	PRINCIPAL SPILLWAY
12,13,14	RISER STRUCTURAL DETAILS
15	HIGH STAGE TRASH RACK & RISER ACCESSORIES
16	CONDUIT DETAILS
17,18	STRUCTURE DRAINAGE DETAILS
19	DROP STRUCTURE DRAINAGE DETAILS (Pipes & Fittings)
20	MISC. DETAILS (Fence, Animal Guard)
21	ISOMETRIC OF STRUCTURE
22	PLAN OF STRUCTURE (PRINCIPAL & AUXILIARY)
23	ARTICULATE JOINT DETAILS & LOCATIONS
24	STRUCTURE DETAILS, DROP SPILLWAY "A"
25	"A" (Wingwall)
26	"A" (Headwall Ext. & Counterfort)
27	"B"
28	"C"
29	"D"
30	"E"
31-33	"F"
34-39	STEEL DETAILS
40,41	"A"
42-44	"B"
45,46	"C"
47,48	"D"
49-54	"E"
55-61	"F"
	DROP STRUCTURE STEEL SCHEDULES



NO PREVENTION ACT

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ACT

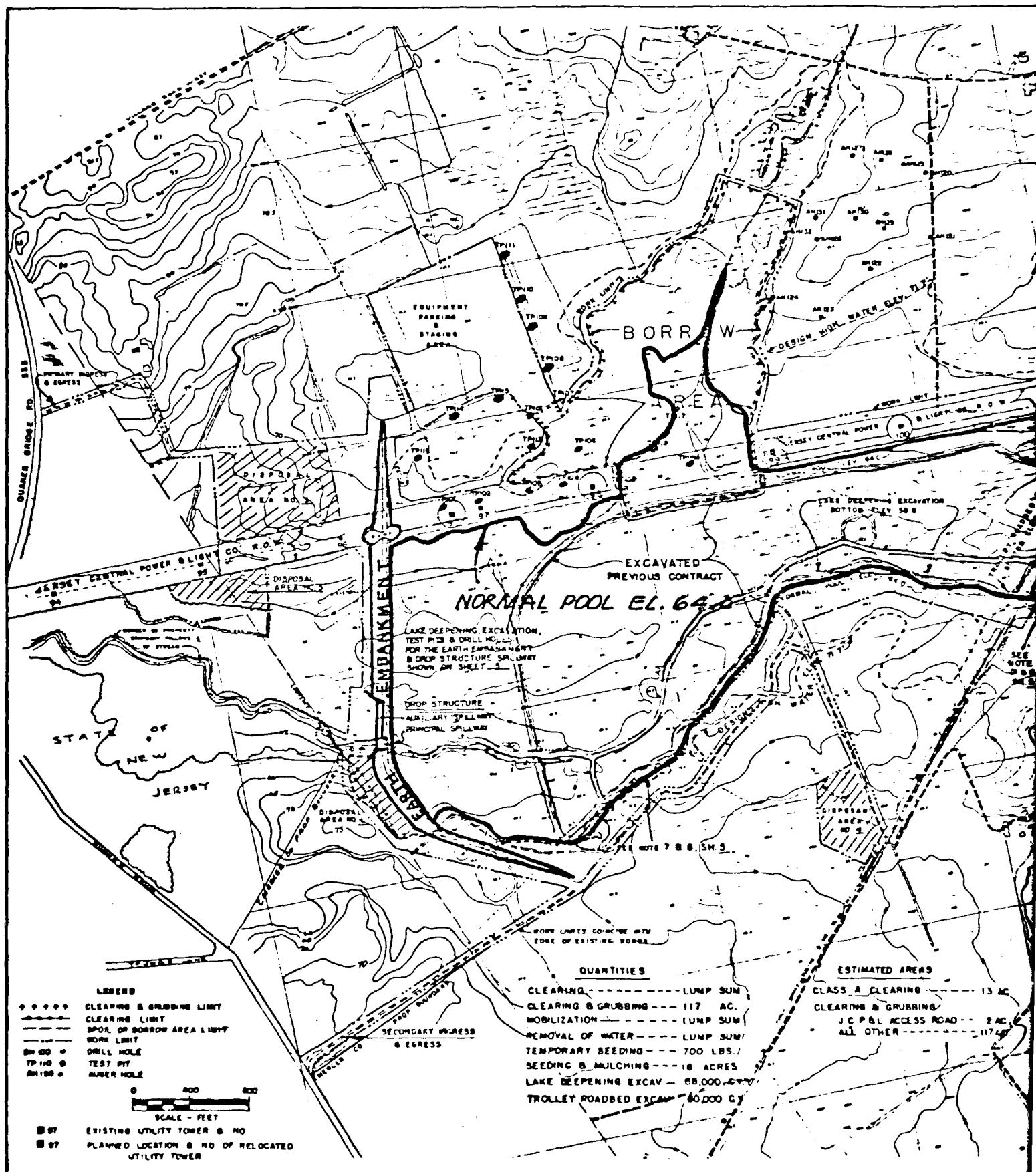
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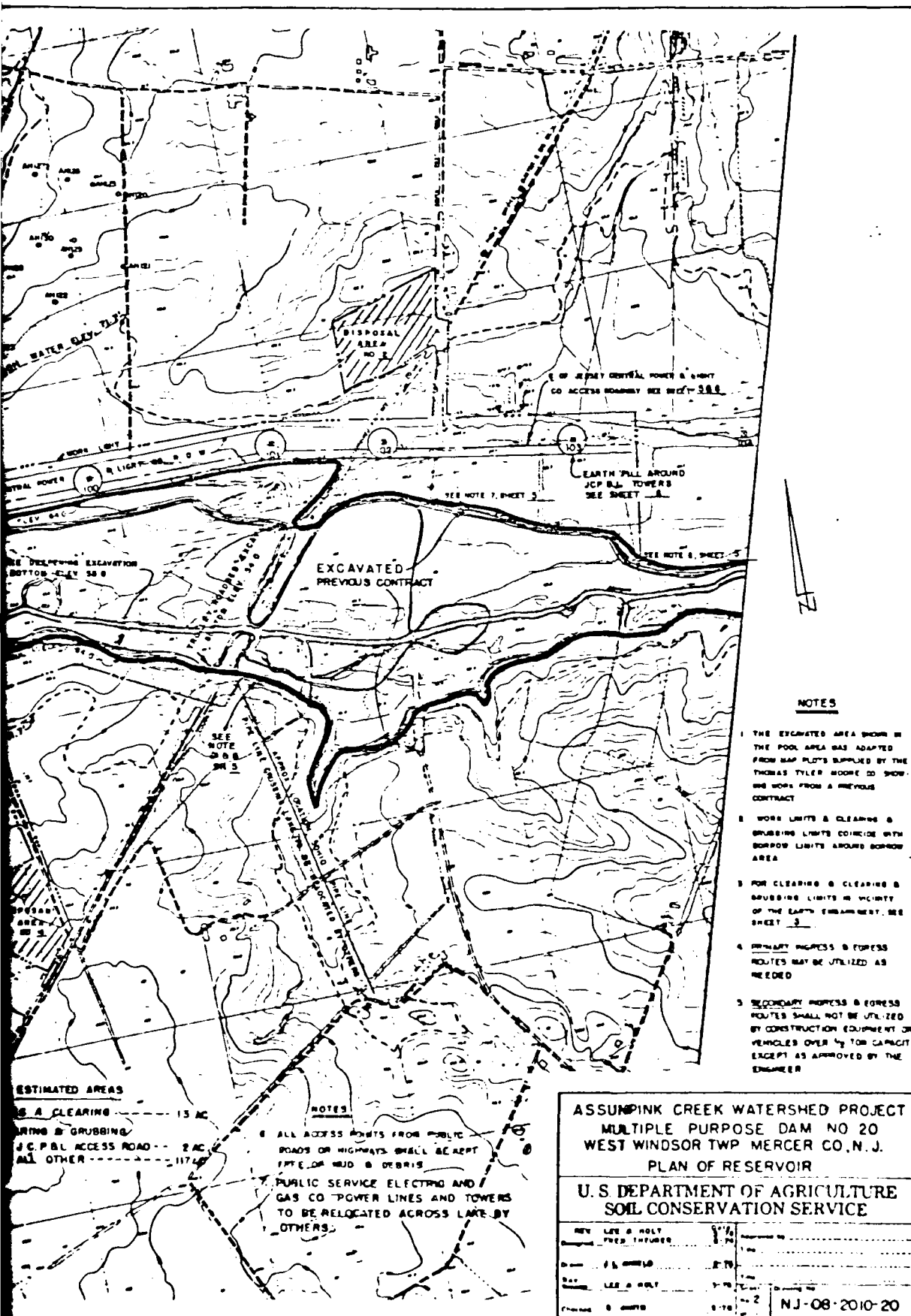
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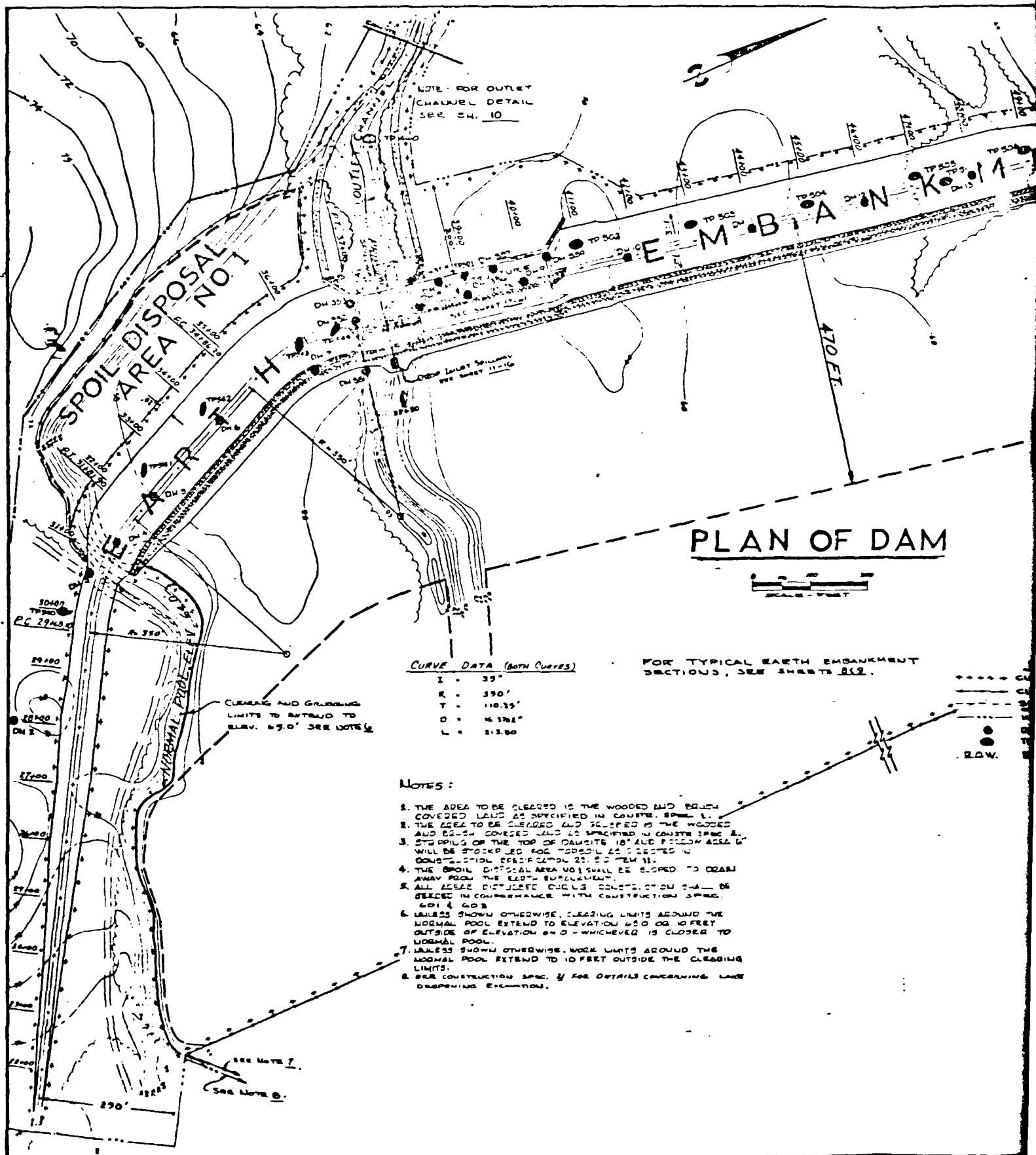
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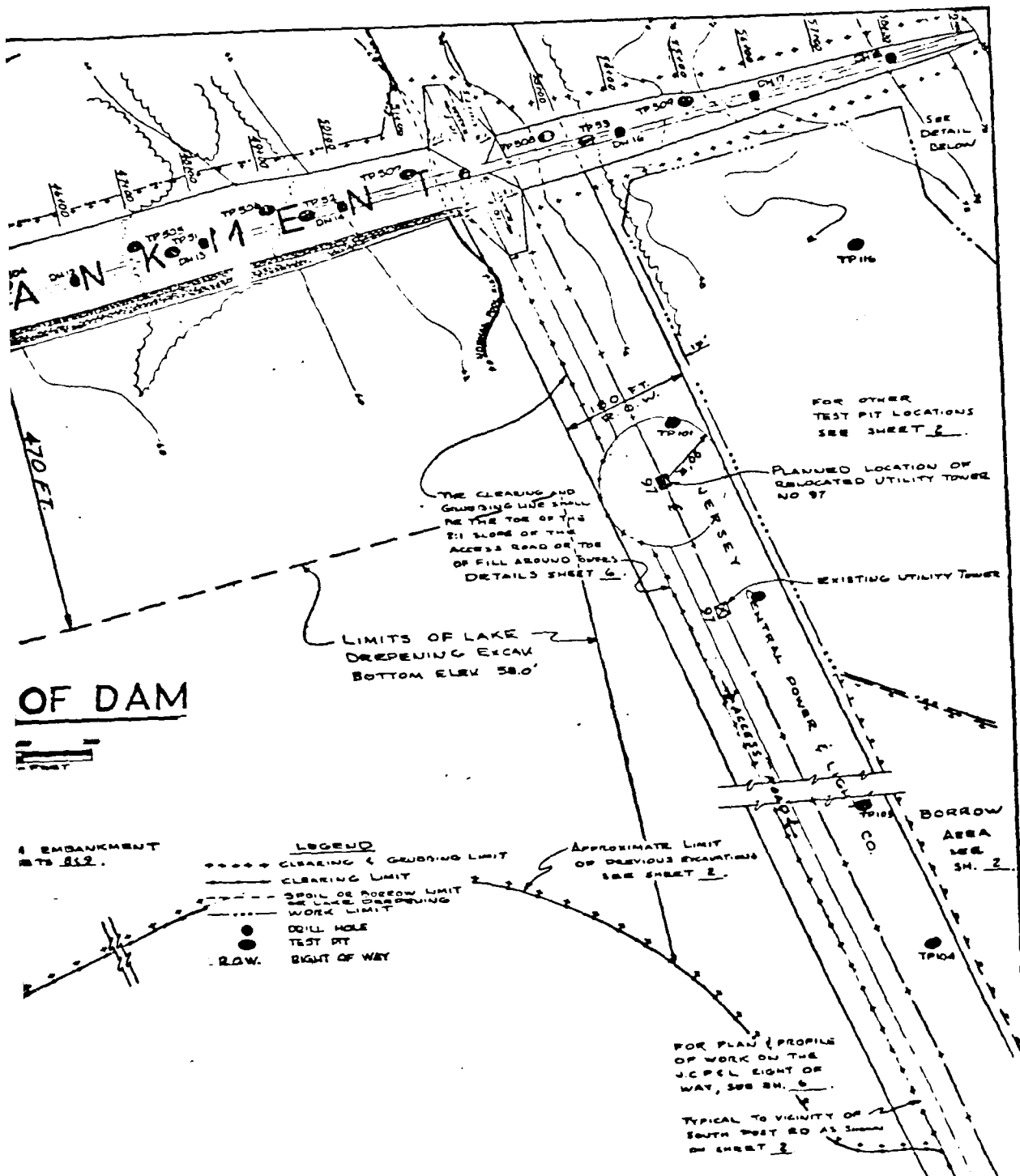
APPROVED BY	DATE
<i>Carl Montana</i> State Commissioner	3/7/76
<i>Ad. B. B. B.</i> State Engineer	3-21-76

SHEET 2







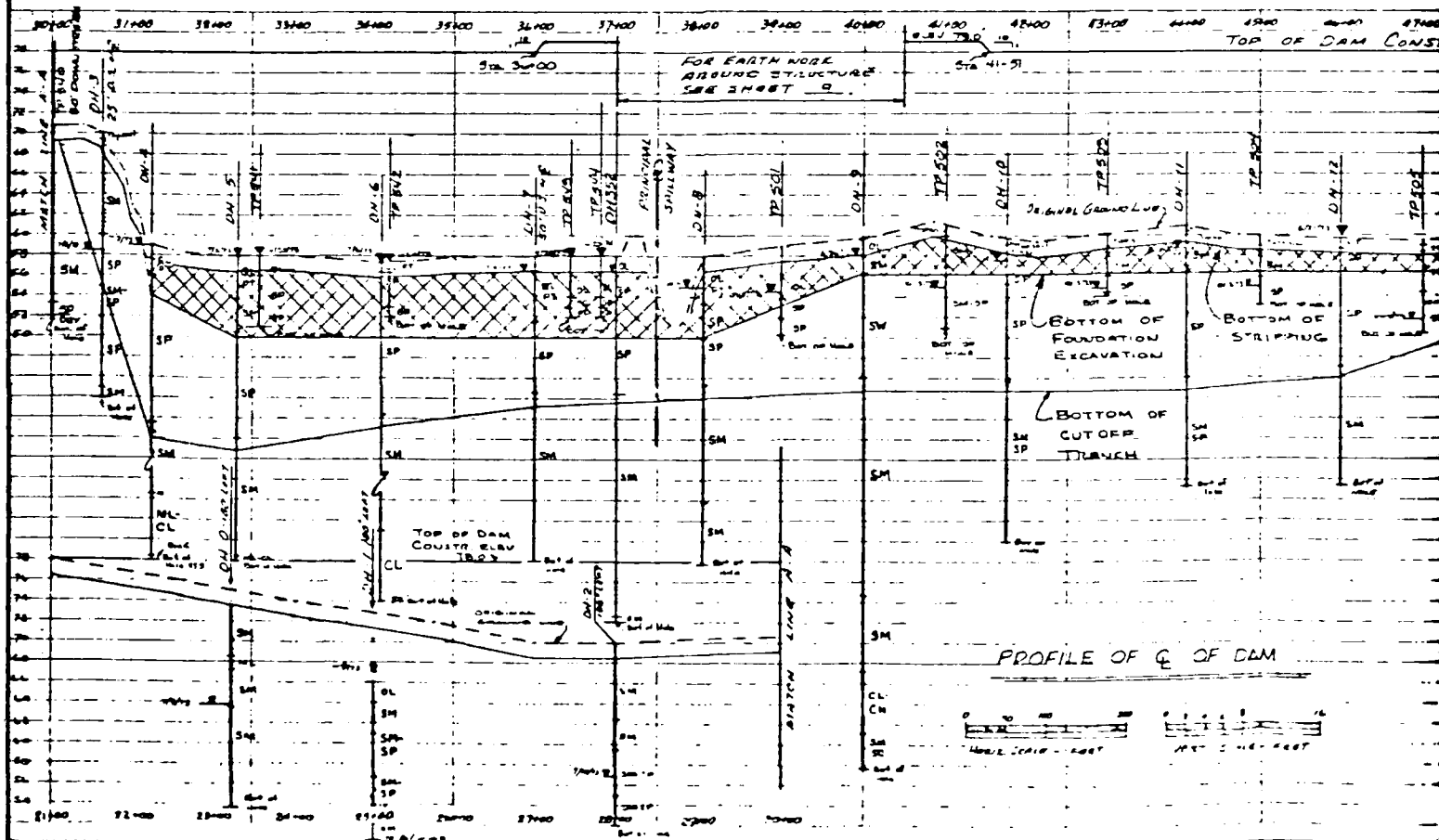
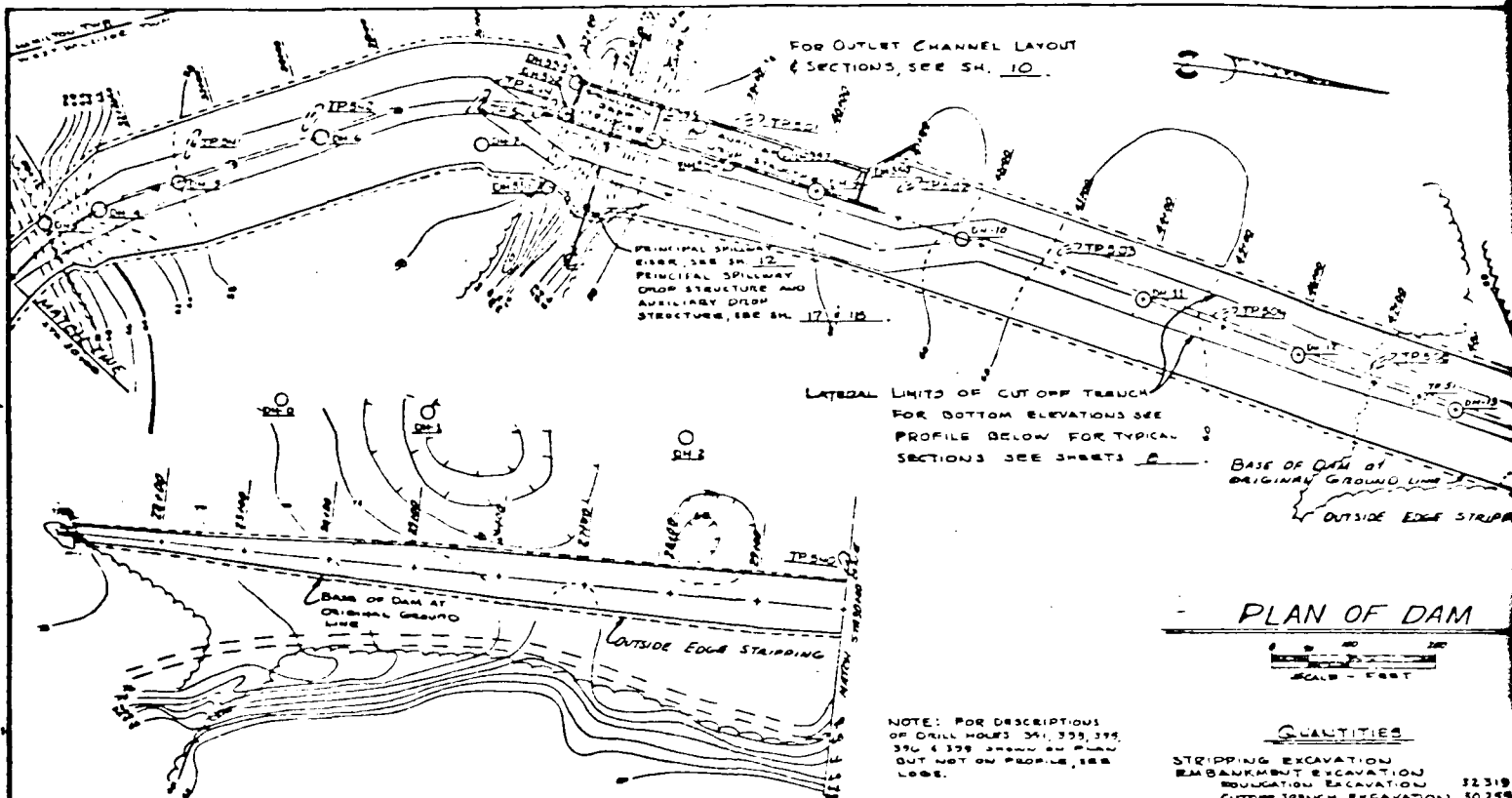


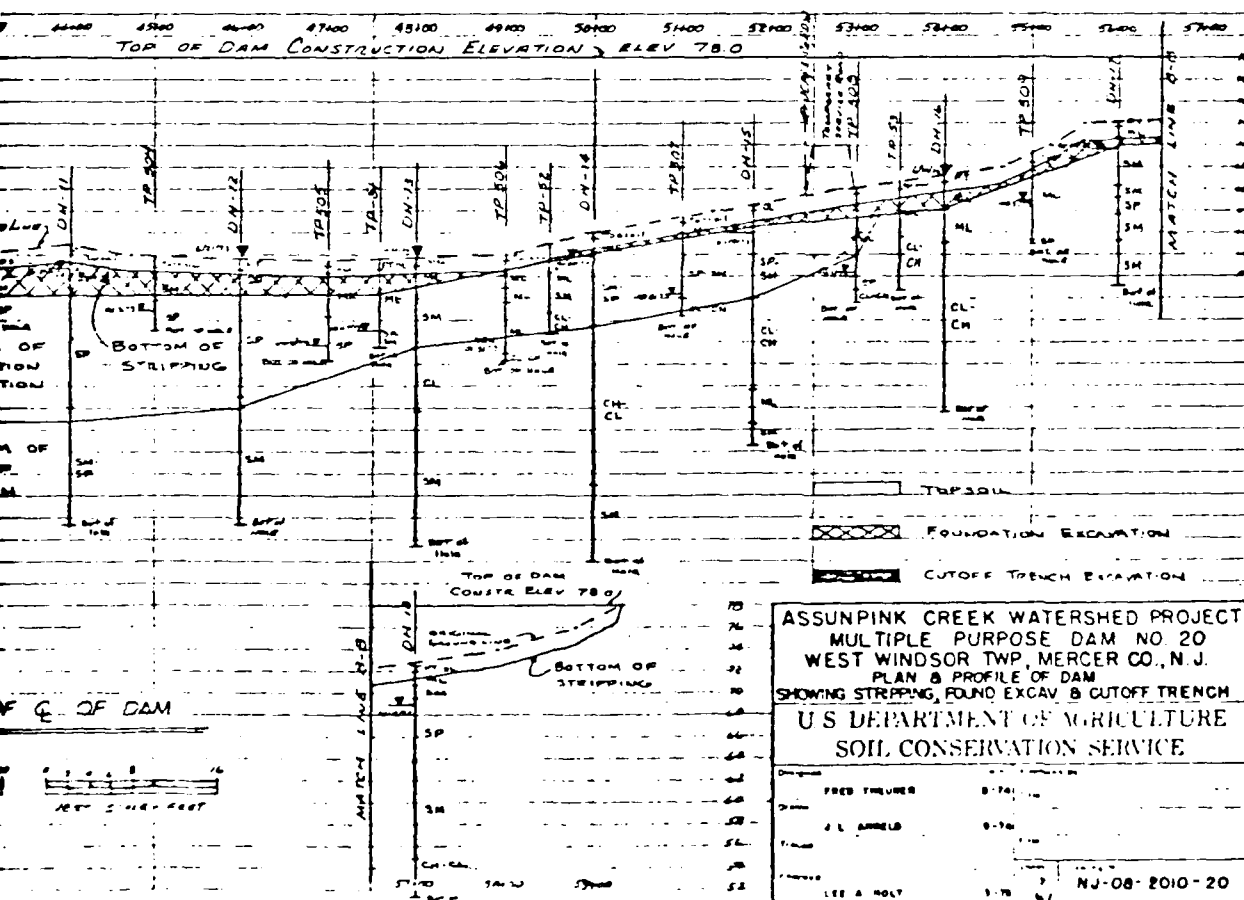
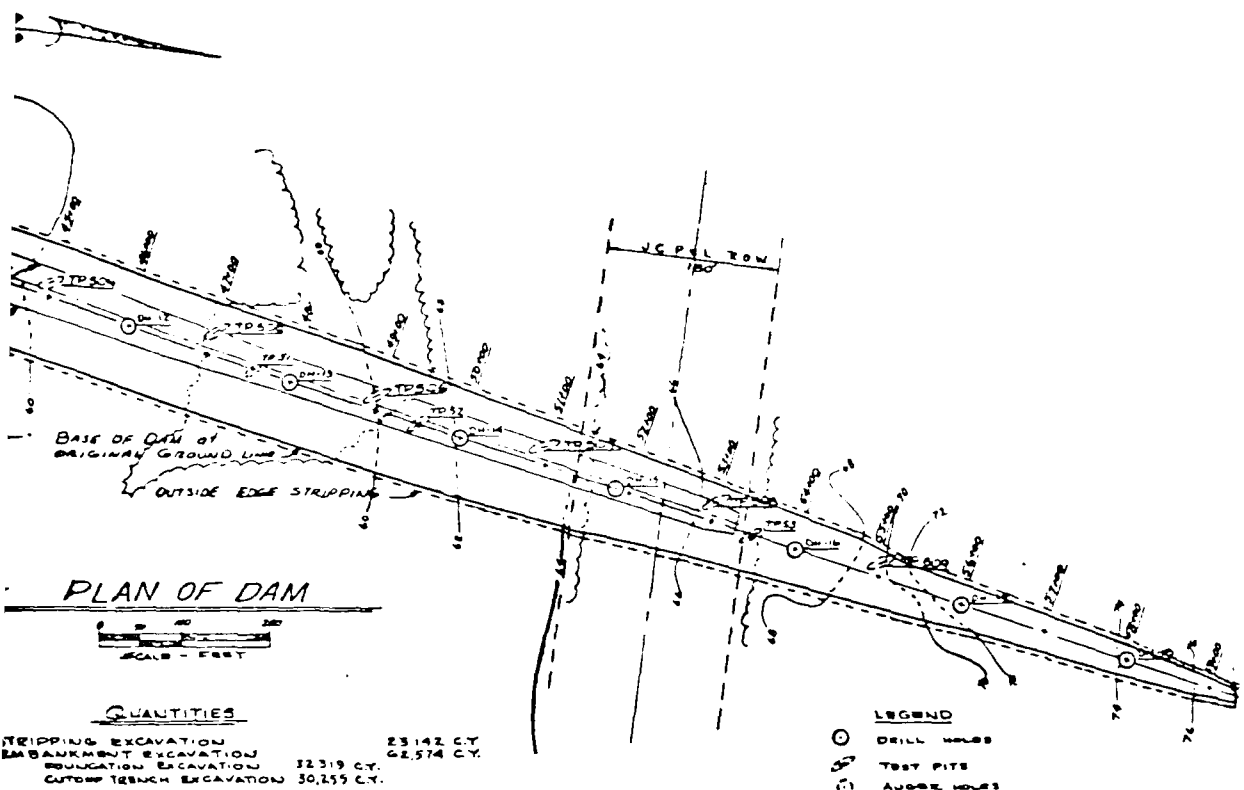
OF DAM

EMBANKMENT
BTS 812

- LEGEND**
- CLEARING & GRADING LIMIT
 - CLEARING LIMIT
 - SPOIL OR BORROW LIMIT OR LAKE DREDGING WORK LIMIT
 - DIRT HOLE
 - TEST PIT
 - R.O.W. RIGHT OF WAY

ASSUMPINK CREEK WATERSHED PROJECT MULTIPLE PURPOSE DAM NO. 20 WEST WINDSOR TWP., MERCER CO., N.J. PLAN OF DAM			
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE			
REV. 100 A	100 B	100 C	100 D
100 E	100 F	100 G	100 H
100 I	100 J	100 K	100 L
100 M	100 N	100 O	100 P
100 Q	100 R	100 S	100 T
100 U	100 V	100 W	100 X
100 Y	100 Z	100 AA	100 AB
100 AC	100 AD	100 AE	100 AF
100 AG	100 AH	100 AI	100 AJ
100 AK	100 AL	100 AM	100 AN
100 AO	100 AP	100 AQ	100 AR
100 AS	100 AT	100 AU	100 AV
100 AW	100 AX	100 AY	100 AZ
100 BA	100 BB	100 BC	100 BD
100 BE	100 BF	100 BG	100 BH
100 BI	100 BJ	100 BK	100 BL
100 BM	100 BN	100 BO	100 BP
100 BQ	100 BR	100 BS	100 BT
100 BU	100 BV	100 BW	100 BX
100 BY	100 BZ	100 CA	100 CB
100 CC	100 CD	100 CE	100 CF
100 CG	100 CH	100 CI	100 CJ
100 CK	100 CL	100 CM	100 CN
100 CO	100 CP	100 CQ	100 CR
100 CS	100 CT	100 CU	100 CV
100 CW	100 CX	100 CY	100 CZ
100 DA	100 DB	100 DC	100 DD
100 DE	100 DF	100 DG	100 DH
100 DI	100 DJ	100 DK	100 DL
100 DM	100 DN	100 DO	100 DP
100 DQ	100 DR	100 DS	100 DT
100 DU	100 DV	100 DW	100 DX
100 DY	100 DZ	100 EA	100 EB
100 EC	100 ED	100 EE	100 EF
100 EG	100 EH	100 EI	100 EJ
100 EK	100 EL	100 EM	100 EN
100 EO	100 EP	100 EQ	100 ER
100 ES	100 ET	100 EU	100 EV
100 EW	100 EX	100 EY	100 EZ
100 FA	100 FB	100 FC	100 FD
100 FE	100 FF	100 FG	100 FH
100 FI	100 FJ	100 FK	100 FL
100 FM	100 FN	100 FO	100 FP
100 FQ	100 FR	100 FS	100 FT
100 FU	100 FV	100 FW	100 FX
100 FY	100 FZ	100 GA	100 GB
100 GC	100 GD	100 GE	100 GF
100 GH	100 GI	100 GO	100 GP
100 GQ	100 GR	100 GS	100 GT
100 GU	100 GV	100 GW	100 GX
100 GY	100 GZ	100 HA	100 HB
100 HC	100 HD	100 HE	100 HF
100 HG	100 HH	100 HI	100 HJ
100 HK	100 HL	100 HM	100 HN
100 HO	100 HP	100 HQ	100 HR
100 HS	100 HT	100 HU	100 HV
100 HW	100 HX	100 HY	100 HZ
100 IA	100 IB	100 IC	100 ID
100 IE	100 IF	100 IG	100 IH
100 II	100 IJ	100 IK	100 IL
100 IM	100 IN	100 IO	100 IP
100 IQ	100 IR	100 IS	100 IT
100 IU	100 IV	100 IW	100 IX
100 IY	100 IZ	100 JA	100 JB
100 JC	100 JD	100 JE	100 JF
100 JG	100 JH	100 JI	100 JJ
100 JK	100 JL	100 JM	100 JN
100 JO	100 JP	100 JQ	100 JR
100 JS	100 JT	100 JU	100 JV
100 JW	100 JX	100 JY	100 JZ
100 KA	100 KB	100 KC	100 KD
100 KE	100 KF	100 KG	100 KH
100 KI	100 KJ	100 KK	100 KL
100 KM	100 KN	100 KO	100 KP
100 KQ	100 KR	100 KS	100 KT
100 KU	100 KV	100 KW	100 KX
100 KY	100 KZ	100 LA	100 LB
100 LC	100 LD	100 LE	100 LF
100 LG	100 LH	100 LI	100 LJ
100 LK	100 LL	100 LM	100 LN
100 LO	100 LP	100 LQ	100 LR
100 LS	100 LT	100 LU	100 LV
100 LW	100 LX	100 LY	100 LZ
100 MA	100 MB	100 MC	100 MD
100 ME	100 MF	100 MG	100 MH
100 MI	100 MJ	100 MK	100 ML
100 MN	100 MO	100 MP	100 MQ
100 MR	100 MS	100 MT	100 MU
100 MV	100 MW	100 MX	100 MY
100 MZ	100 NA	100 NB	100 NC
100 ND	100 NE	100 NF	100 NG
100 NH	100 NI	100 NJ	100 NK
100 NL	100 NM	100 NO	100 NP
100 NQ	100 NR	100 NS	100 NT
100 NU	100 NV	100 NW	100 NX
100 NY	100 NZ	100 OA	100 OB
100 OC	100 OD	100 OE	100 OF
100 OG	100 OH	100 OI	100 OJ
100 OK	100 OL	100 OM	100 ON
100 OO	100 OP	100 OQ	100 OR
100 OS	100 OT	100 OU	100 OV
100 OW	100 OX	100 OY	100 OZ
100 PA	100 PB	100 PC	100 PD
100 PE	100 PF	100 PG	100 PH
100 PI	100 PJ	100 PK	100 PL
100 PM	100 PN	100 PO	100 PP
100 PQ	100 PR	100 PS	100 PT
100 PU	100 PV	100 PW	100 PX
100 PY	100 PZ	100 QA	100 QB
100 QC	100 QD	100 QE	100 QF
100 QG	100 QH	100 QI	100 QJ
100 QK	100 QL	100 QM	100 QN
100 QO	100 QP	100 QQ	100 QR
100 QS	100 QT	100 QU	100 QV
100 QW	100 QX	100 QY	100 QZ
100 RA	100 RB	100 RC	100 RD
100 RE	100 RF	100 RG	100 RH
100 RI	100 RJ	100 RK	100 RL
100 RM	100 RN	100 RO	100 RP
100 RQ	100 RR	100 RS	100 RT
100 RU	100 RV	100 RW	100 RX
100 RY	100 RZ	100 SA	100 SB
100 SC	100 SD	100 SE	100 SF
100 SG	100 SH	100 SI	100 SJ
100 SK	100 SL	100 SM	100 SN
100 SO	100 SP	100 SQ	100 SR
100 SS	100 ST	100 SU	100 SV
100 SW	100 SX	100 SY	100 SZ
100 TA	100 TB	100 TC	100 TD
100 TE	100 TF	100 TG	100 TH
100 TI	100 TJ	100 TK	100 TL
100 TM	100 TN	100 TO	100 TP
100 TQ	100 TR	100 TS	100 TT
100 TU	100 TV	100 TW	100 TX
100 TY	100 TZ	100 UA	100 UB
100 UC	100 UD	100 UE	100 UF
100 UG	100 UH	100 UI	100 UJ
100 UK	100 UL	100 UM	100 UN
100 UO	100 UP	100 UQ	100 UR
100 US	100 UT	100 UY	100 UZ
100 VA	100 VB	100 VC	100 VD
100 VE	100 VF	100 VG	100 VH
100 VI	100 VJ	100 VK	100 VL
100 VM	100 VN	100 VO	100 VP
100 VQ	100 VR	100 VS	100 VT
100 VW	100 VX	100 VY	100 VZ
100 WA	100 WB	100 WC	100 WD
100 WE	100 WF	100 WG	100 WH
100 WI	100 WJ	100 WK	100 WL
100 WM	100 WN	100 WO	100 WP
100 WQ	100 WR	100 WS	100 WT
100 WY	100 WZ	100 XA	100 XB
100 XC	100 XD	100 XE	100 XF
100 XG	100 XH	100 XI	100 XJ
100 XK	100 XL	100 XM	100 XN
100 XO	100 XP	100 XQ	100 XR
100 XS	100 XT	100 XU	

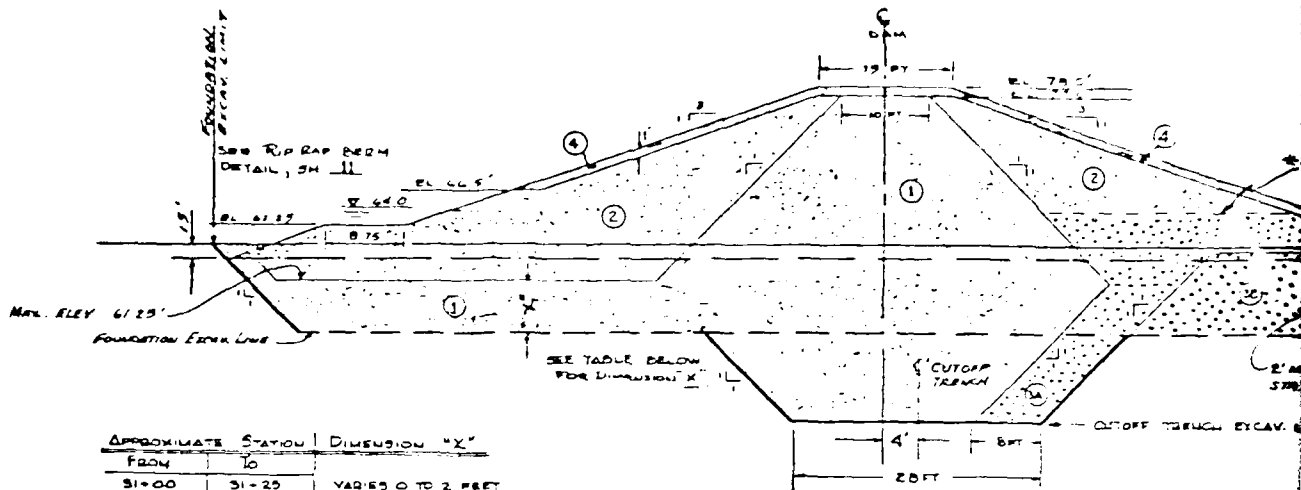




ASSUNPINK CREEK WATERSHED PROJECT
 MULTIPLE PURPOSE DAM NO 20
 WEST WINDSOR TWP, MERCER CO., N.J.
 PLAN & PROFILE OF DAM
 SHOWING STRIPPING, FOUND EXCAV & CUTOFF TRENCH
 U.S. DEPARTMENT OF AGRICULTURE
 SOIL CONSERVATION SERVICE

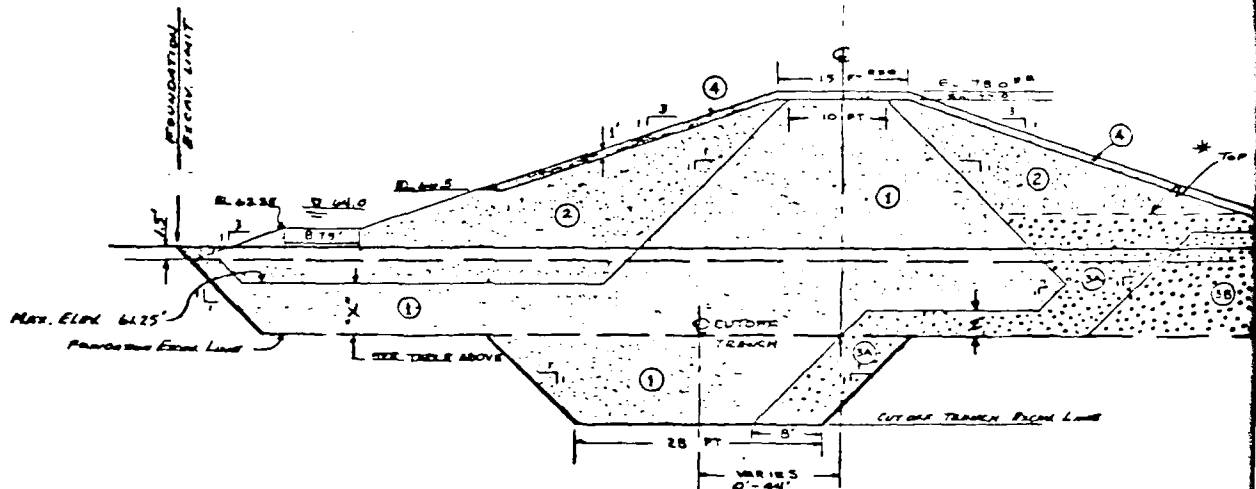
DESIGNED BY: FRED THURMER
 DRAWN BY: J. L. ARNOLD
 CHECKED BY: LEE A. HOLY
 DATE: 8-74
 PROJECT NO: NJ-08-2010-20

SHEETS



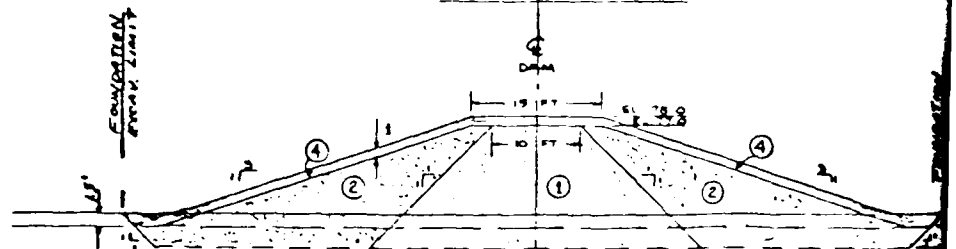
TYPICAL EMBANKMENT SECTION

TYPICAL FROM STA 30+00 TO 34+00
AND
FROM STA 42+00 TO 53+25



TYPICAL EMBANKMENT SECTION

FROM STA 36+00 TO 37+00
AND
FROM STA 40+50 TO 42+00

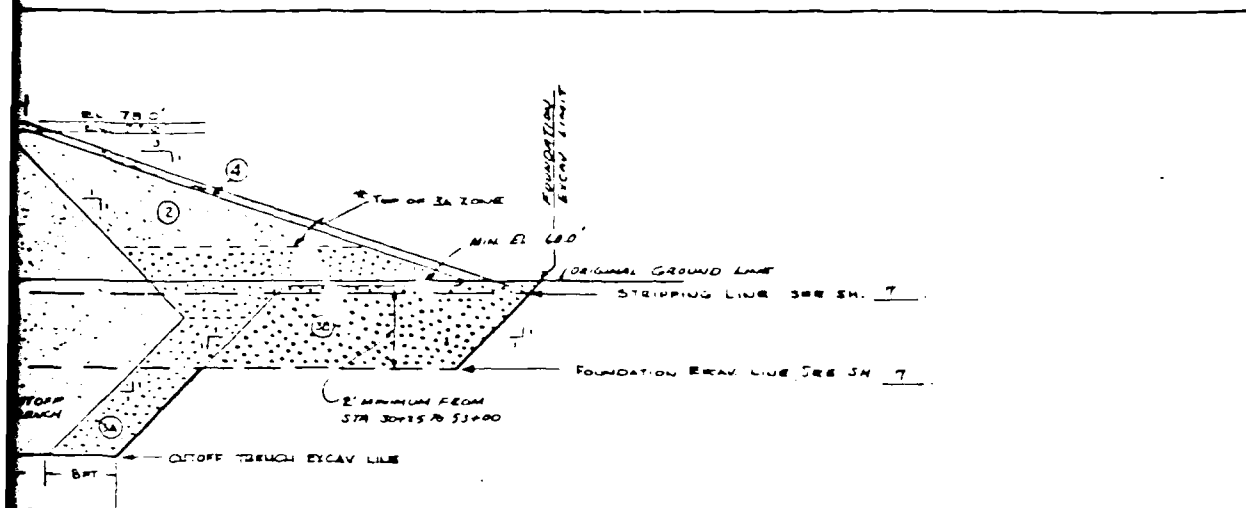


TYPICAL EMBANKMENT SECTION

TYPICAL FROM STA 21+00 TO 30+00
AND FROM STA 33+25 TO 34+00

NO SCALE

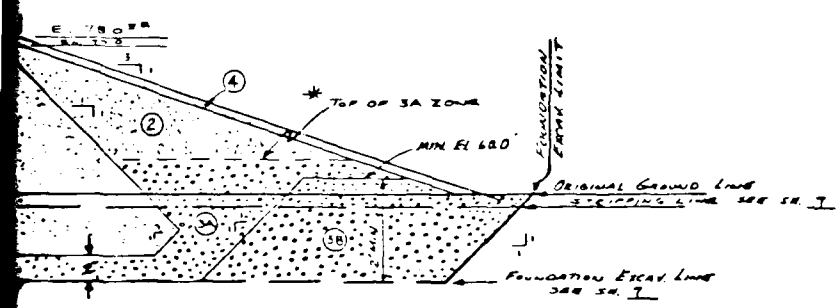
SEE EXHIBIT 10 FOR DETAILS



SECTION
 3000 TO 31+00
 32 TO 33+25

* THE TOP ELEVATION OF THIS ZONE MAY VARY WITH THE EXCESS OF 3A MATERIAL LEFT FROM PROCESSING REQUIRED TO OBTAIN THE 3B MATERIAL. THE RANGE EXPECTED FOR THE TOP IS BETWEEN ELEV 61.0' AND 67.0'.

OR EL. 74.0 BETWEEN STA 36+10 & 37+00
 AND BETWEEN STA 40+30 & 41+41
 OR EL. 80' BETWEEN STA 36+00 & 37+00
 AND BETWEEN STA 40+30 & 41+41

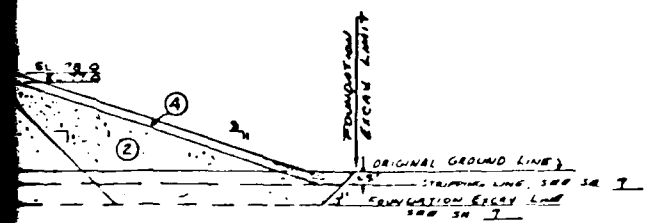


OFF-TOE TRENCH EXCAV. LINE

SECTION
 37+00
 42 TO 42+00

QUANTITIES

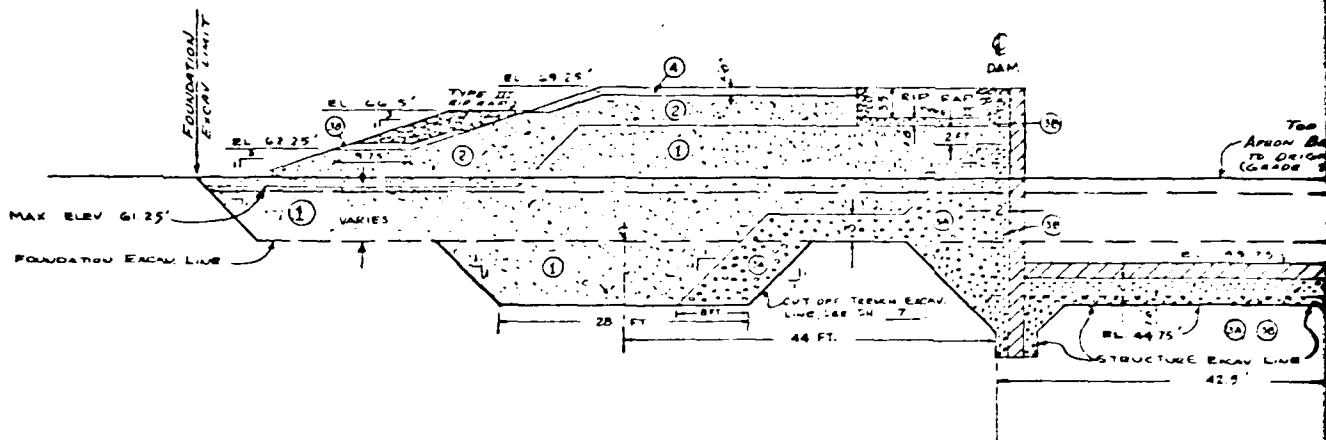
EARTH FILL, ZONE 1	21,486	CY
EARTH FILL, ZONE 2 & 3A	2,300	CY
GRAIN FILL, ZONE 3B	2,883	CY
EARTH FILL, ZONE 3 & 4A	2,102	CY



SECTION
 35+00 TO 37+00
 38 TO 39+00

ASSUNPINK CREEK WATERSHED PROJECT MULTIPLE PURPOSE DAM NO 20 WEST WINDSOR TWP, MERCER CO, N.J. TYPICAL SECTIONS & ZONING	
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	
Designed by E. S. HIGGINS	App. made by E. S. HIGGINS
Drawn by J. L. AUGER	App. made by J. L. AUGER
Checked by E. S. HIGGINS	App. made by E. S. HIGGINS
Engineer E. S. HIGGINS	Stamp: NJ-06-2010-20

SHEET 6

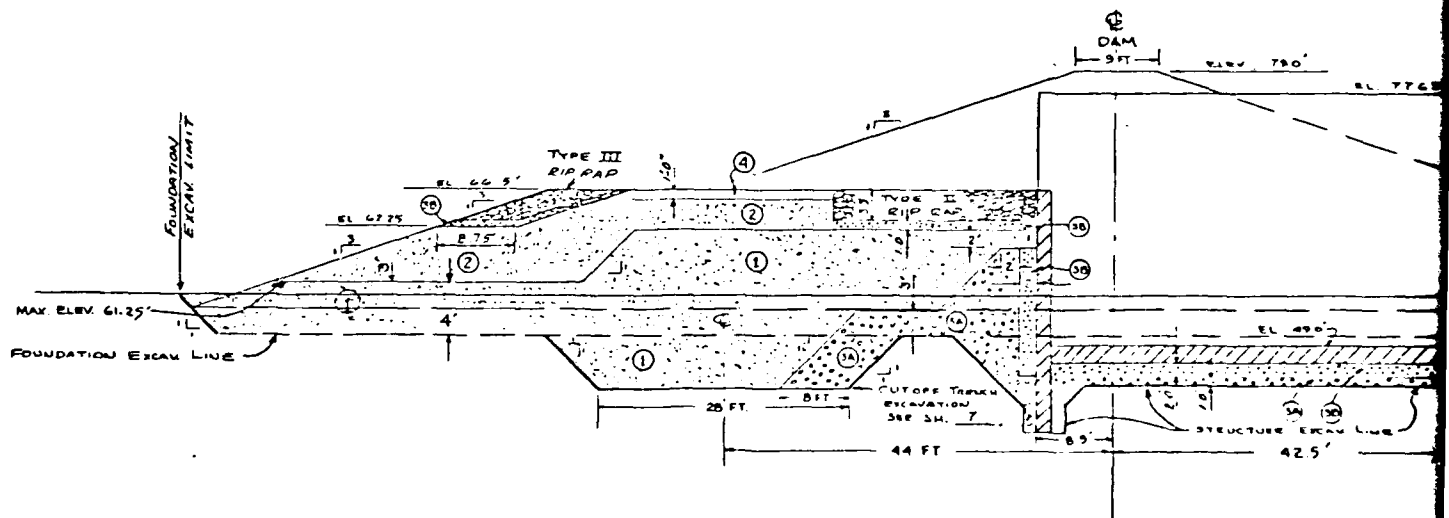


QUANTITIES

STRUCTURE EXCAVATION -- 13,906 CY.

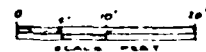
TYPICAL EMBANKMENT SECTION

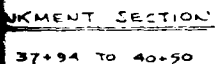
FROM STA. 37+94 TO 40+50



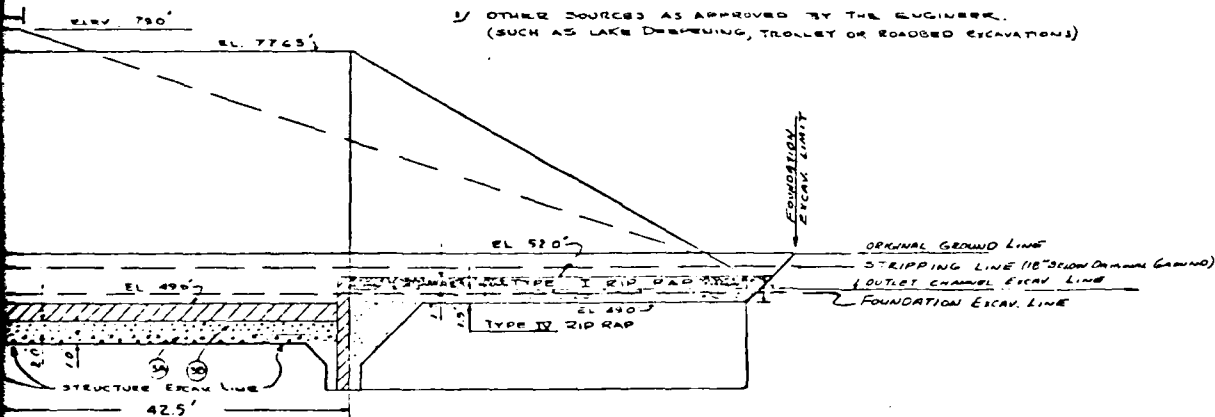
TYPICAL EMBANKMENT SECTION

FROM STA. 37+00 TO 37+94



[illegible]

1/ OTHER SOURCES AS APPROVED BY THE ENGINEER.
(SUCH AS LAKE DREDGING, TROLLEY OR ROADBED EXCAVATIONS)



ANKMENT SECTION

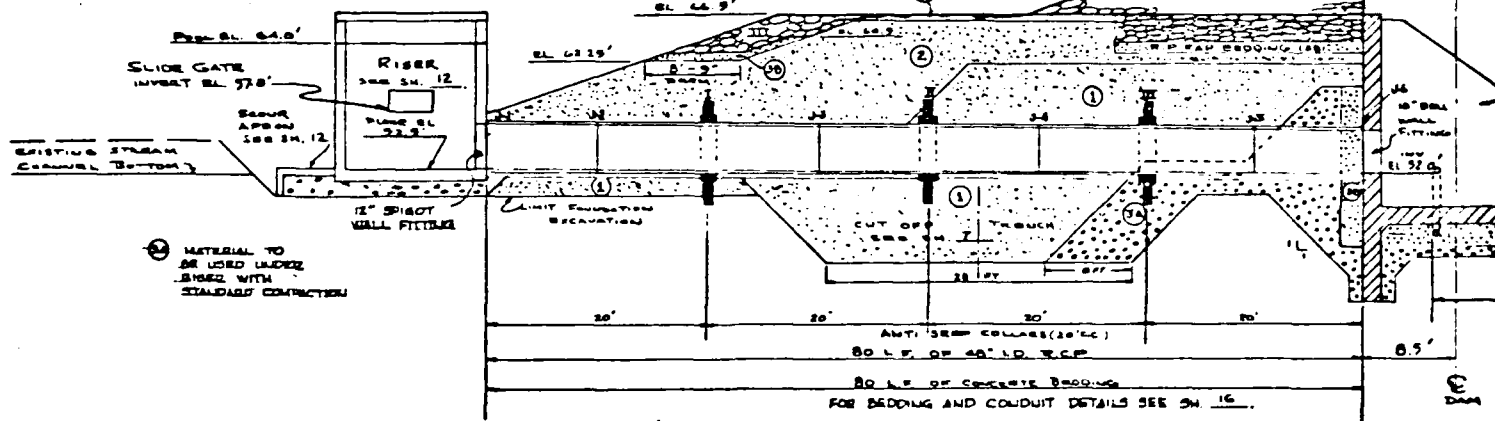
37+00 TO 37+94

ASSUNPINK CREEK WATERSHED PROJECT
MULTIPLE PURPOSE DAM NO. 20
WEST WINDSOR TWP, MERCER CO., N.J.
TYPICAL SECTIONS & ZONING

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed	J. M. HAY	3-79	
Drawn	J. L. ANDERSON	6-80	
Titled			
Checked	L. A. MOULT	3-79	
Appr'd by			NJ-08-2010-20

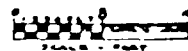
SHEET 7

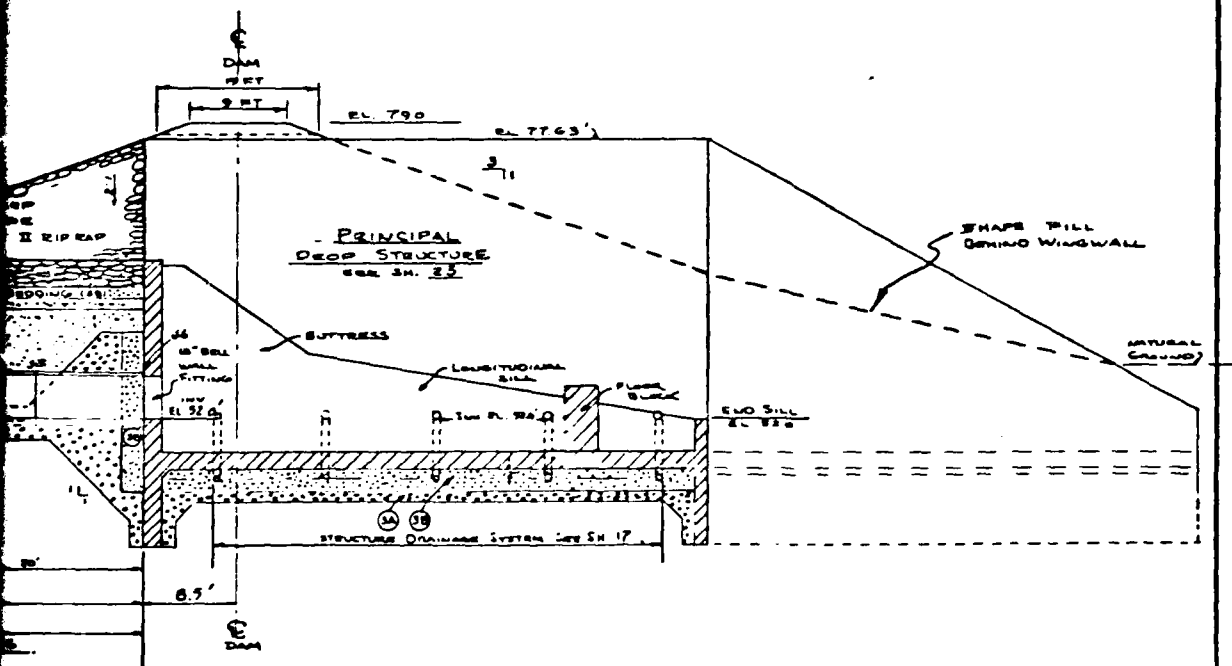
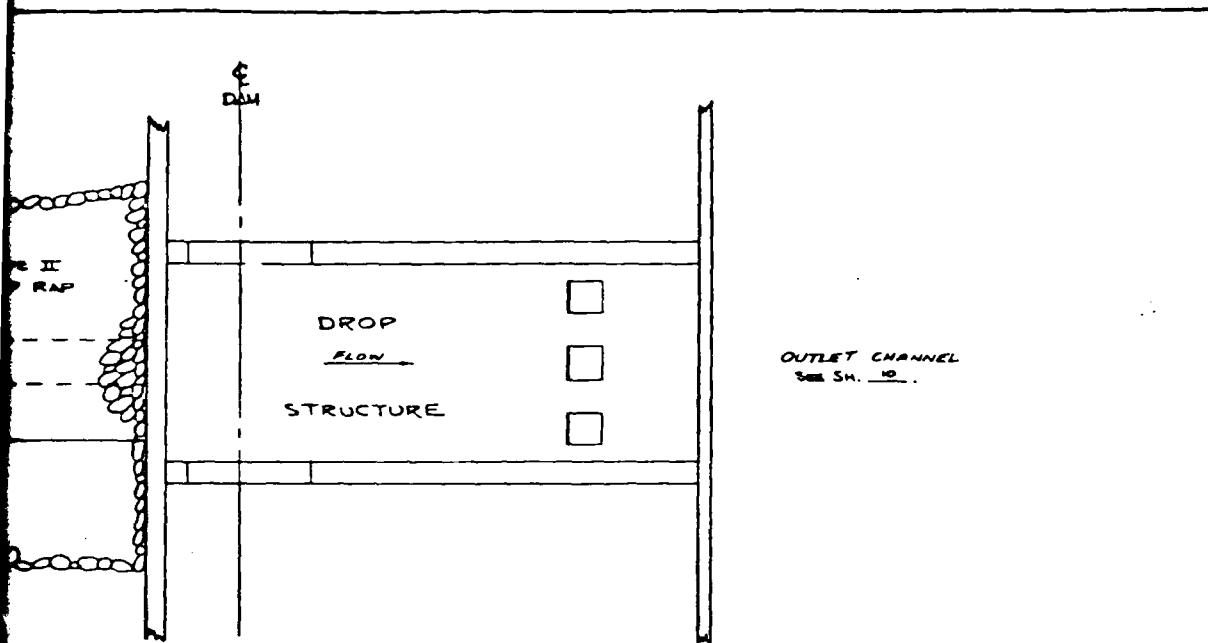


NOTE: CONSTRUCTION DETAILS

NOTE: CONSTRUCTION DETAILS

4" NO. 80 DIAMETER BELLORED CONCRETE WATER
PIPE - SPEC. NO. 1 - 10' SECT' ONLY, 2 REQUIRED; 20'
SECTIONS, 3 REQUIRED - TOTAL WALL LENGTH DOES
NOT INCLUDE THE 12" SP. AT BELL FITTING AT THE
B-PILE & THE 10' BELL WALL FITTING AT THE DEEP
STRUCTURE.





PIPE	DISTANCE FROM	WYLET
DIAMETER	BASE WALL	ELEVATION
1-1	0'	72.73
1-2	10'	72.44
1-3	30'	72.5
1-4	50'	72.7
1-5	70'	72.26
1-6	90'	72.26

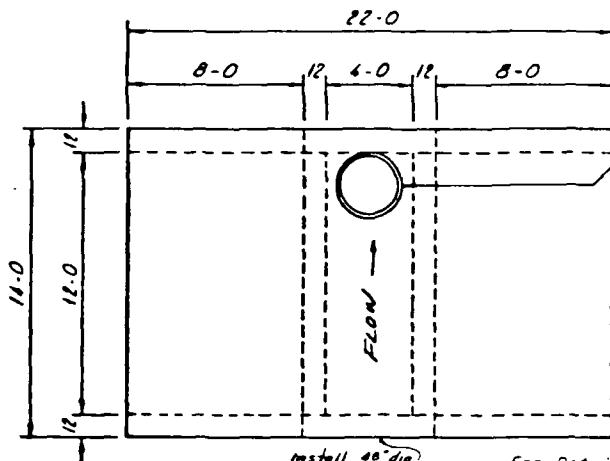
COLLAR	DISTANCE FROM	WYLET
	BASE WALL	ELEVATION
I	20'	72.78
II	40'	72.72
III	60'	72.17

ASSUNPINK CREEK WATERSHED PROJECT
MULTIPLE PURPOSE DAM NO 20
WEST WINDSOR TWP, MERCER CO., N. J.
PRINCIPAL SPILLWAY

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

DESIGNED BY	DATE
CHECKED BY	DATE
APPROVED BY	DATE
PROJECT NO. NJ-08-2010-20	

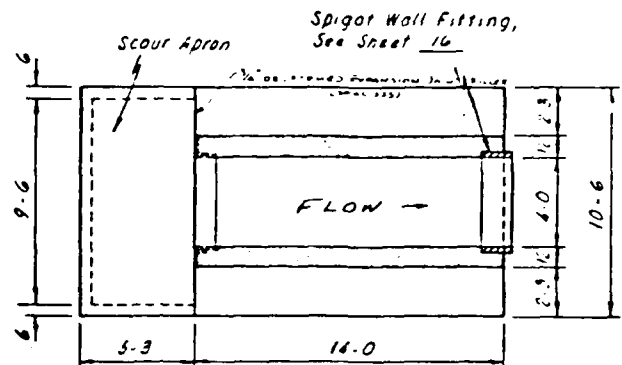
SHEET 8



Install 48" dia
Slide Gate, see
Contra Spec. 71

For Detail Of
Trashrack Angle & Grating,
See Sheet 15

TOP PLAN



SECTION A-A

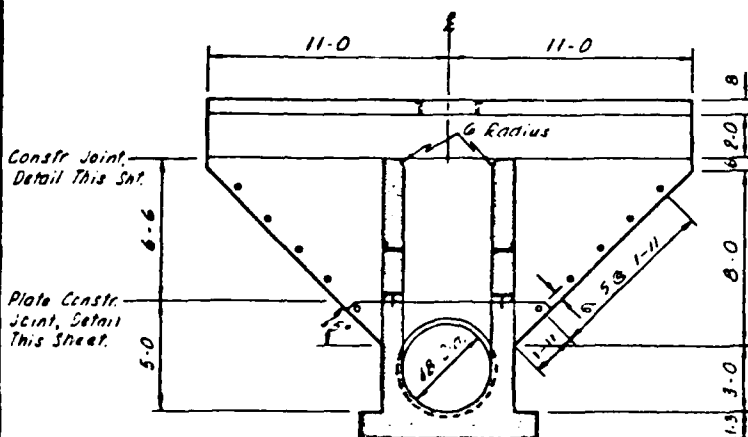
1/2" x 6" Carbon Steel Shear Plate
To Conform to Spec. 5B1,
Continuous Thru Constr. Joint
Splices Shall Be Either:
1. Butt Welded
2. Lapped 3" & Bolted
3. Lapped 3" & Fillet Welded



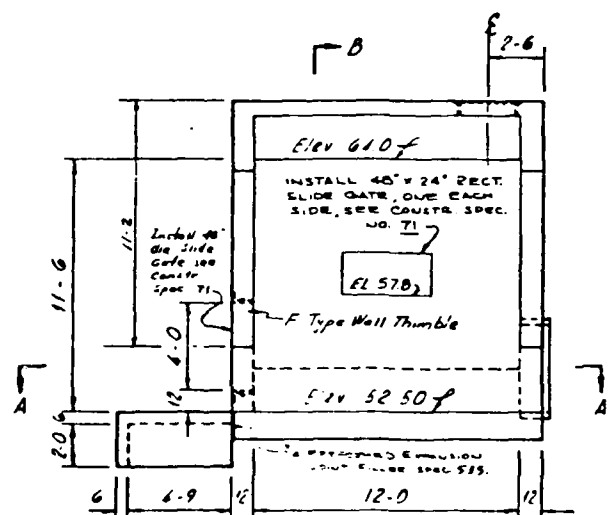
PLATE
CONSTR JOINT



CONSTR JOINT



SECTION B-B



SIDEWALL ELEVATION

STEEL SCHEDULE

MARK	SIZE	QUANTITY	LENGTH	TYPE	D	C	TOTAL LENGTH
1	4	11	6-9	21	4-9	5-3	7-2
2	4	0	7-3	21	5-8	5-3	7-8
3	4	6	10-2	21	5-5	6-9	81-6
4	6	6	4-2	1			26-7
5	4	1	13-2				148-6
6	4	4	15-2	1			160-0
7	6	5	12-2	1			62-2
8	6	2	13-2				81-2
9	6	3	15-2				130-2
10	6	2	2-9				5-6
11	5	2	8-5	21	7-5	1-0	16-10
12	5	3	2-9	21	1-9	1-0	9-6
13	5	3	2-6	21	1-6	1-0	7-6
14	5	2	1-2	21	2-6	1-0	3-0
15	5	28	10-1	21	7-5	3-6	305-8
16	5	2	9-3	1			19-2
17	5	7	2-3	1			15-9
18	5	3	2-3	21	1-3	1-0	6-3
19	5	2	2-4	21	1-4	1-0	4-8
20	5	6	3-3	1			19-6
21	5	7	2-3	1			15-9
22	5	26	7-1	21	6-11	1-0	205-10
23	5	4	11-2	21	7-7	3-7	46-8
24	5	8	8-4	21	7-7	0-9	66-8
25	5	4	8-0	21	7-7	1-3	35-4
26	5	4	7-5	1			30-0
27	5	10	13-0	1			130-0
28	5	2	5-2	1			12-0
29	5	8	4-9	1			38-0
30	5	48	6-2	1			500-2
31	5	28	9-7	21	7-7	1-2	260-4
32	5	14	13-2	1			182-0
33	5	8	11-7	19	8-2	2-9	92-8
34	5	8	3-6	1			28-0
35	5	8	4-6	1			36-0
36	5	8	3-6	1			64-0
37	5	8	2-6	1			52-0
38	5	8	7-6	1			60-0
39	5	8	4-6	1			66-0
40	5	36	8-9	1			315-0
41	5	4	12-0	1			40-0
42	5	4	12-0	1			48-0
43	5	4	14-0	1			56-0
44	5	4	14-0	1			66-0
45	5	4	18-0	1			72-0
46	5	4	20-0	1			80-0
47	5	12	21-6	1			258-0
48	7	3	9-6	1			28-6
49	7	20	13-2	1			260-0
50	4	22	21-6	1			473-0
51	4	12	9-3	1			111-0
52	5	3	11-6	21	9-9	1-9	36-6
53	5	3	2-6	21	0-9	1-9	7-6
54	5	40	9-4	21	7-7	1-9	309-4

QUANTITIES

REINFORCING STEEL:

#4 Bars = 1065.1 Lin. Ft. = 711 Lbs.
 #5 Bars = 3361.5 Lin. Ft. = 3506 Lbs.
 #6 Bars = 303.0 Lin. Ft. = 455 Lbs.
 #7 Bars = 288.5 Lin. Ft. = 590 Lbs.
 Total = 5262 Lbs.

CONCRETE

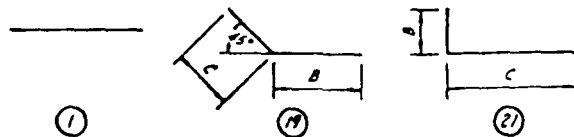
Class 4000 = 51.2 Cu. Yds.

SLIDE GATE, 48 INCH DIA. - 3 EA.
 SLIDE GATE, 48"x24" RECT. - 2 EA.

NOTES:

1. Bar Dimensions are out to out of bar.
2. The 2" and 3" dimensions from face of concrete to steel are clear distances.
3. Radius bends equal 3 bar diameters for sizes equal to or less than #7 bar.
4. Cut or bend reinforcing steel to accommodate 2- 48"x24" rect. slide gates.

BAR TYPES



0 1 2 3 4 5 Feet
 SCALE

ASSUNPINK CREEK WATERSHED PROJECT
 MULTIPLE PURPOSE DAM NO 20
 MERCER COUNTY, N.J.

RISER STRUCTURAL DETAILS

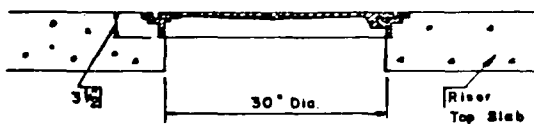
U. S. DEPARTMENT OF AGRICULTURE
 SOIL CONSERVATION SERVICE

Project: J. S. Beck	Date: June 76	Approved By: _____
By: M. H. Beck	Date: Jan. 77	Checked By: _____
Drawn: J. S. Beck	Date: 5/76	Scale: 1" = 12'
Revised: _____	Date: _____	Sheet: NJ-08-2010-25

SHEET 9

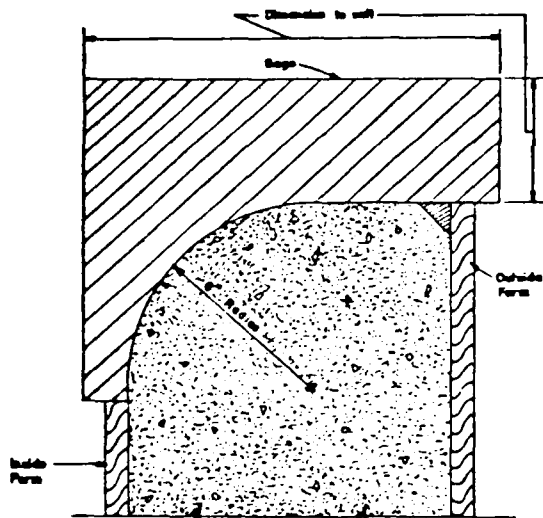
MANHOLE ASSEMBLY

1. The aluminum manhole frame and cover shall be cast aluminum, 30" I.D., Model R-6077-A as manufactured by Neenah Foundry Co. or approved equal.
2. Locking device shall be Type D, locking bar shall be aluminum, staples at both ends of locking bar shall be stainless steel.
3. Lifting device shall be Type B, lifting ring and bolt shall be bronze.
4. Manhole frame and cover shall be installed in conformance with manufacturers recommendations.



QUANTITIES:

Metal Fabrication & Installation - Lump Sum.



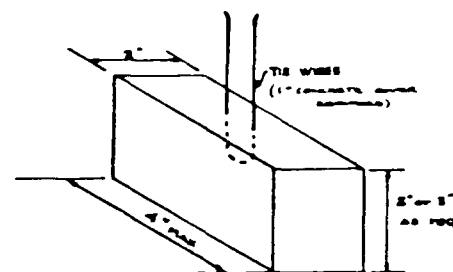
MATERIAL - Wood or Sheet Steel - 1 Req'd. Contractor to provide and use gage. Except for bottom gaging edge, shape of gage is at the option of contractor. Under no circumstances shall forms, braces, walers, etc. be so located as to interfere with the accurate shaping of curved weir section of corners and throughout its entire length.

RISER WEIR RADIUS GAGE

NOT TO SCALE

CONSTRUCTION DETAILS FOR TRASH RACK

1. Material in high stage trash rack shall conform to Spec 581 unless specified otherwise.
2. Nuts, bolts, washers, pipe sleeves shall be stainless steel.
3. All angles and straps to be fabricated of structural aluminum.
4. Grating panels shall be aluminum, Type B, Size 11, as manufactured by Borden Metal Products Co. Elizabeth, N.J., or approved equal.
5. After installation, upset threads on all bolts.



SUGGESTED PRECAST CLASS 4000 CONCRETE CHAIR

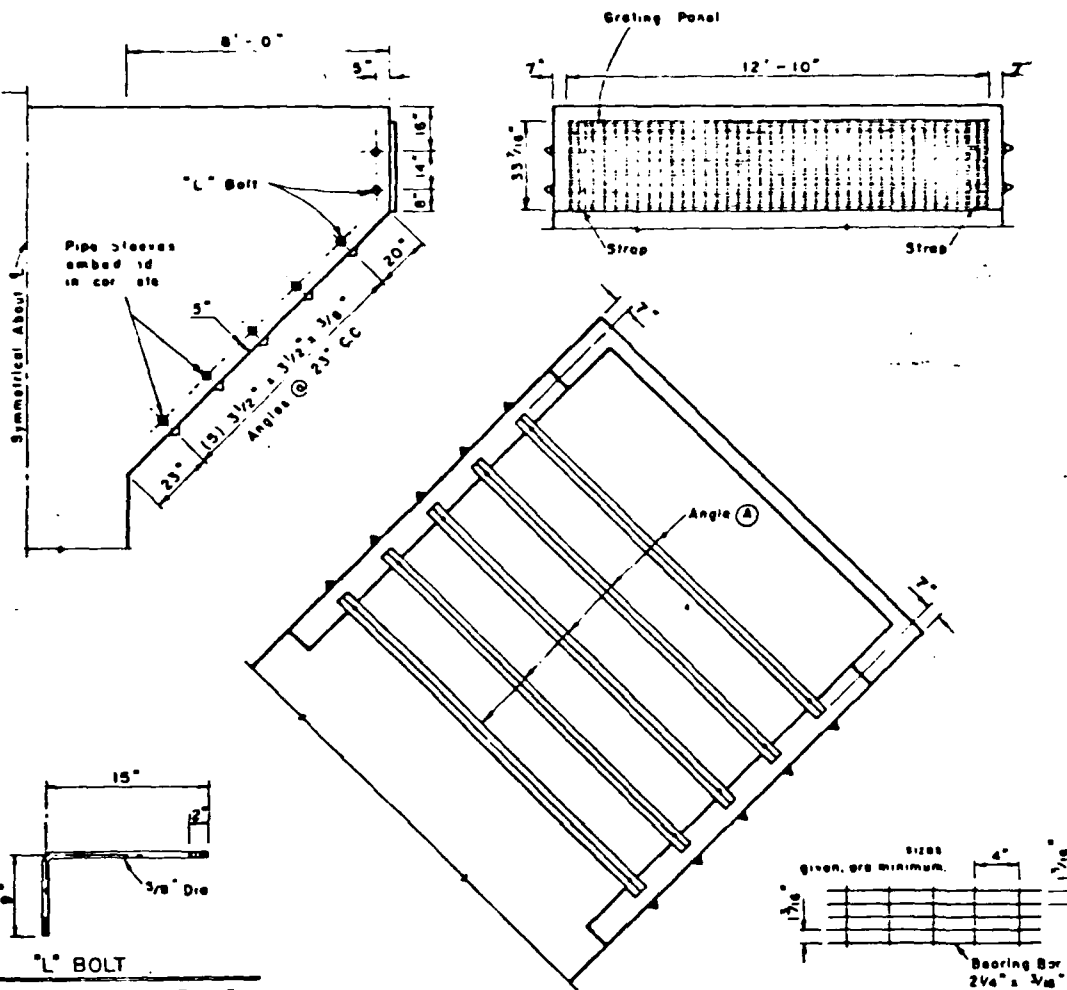
Supply with

RACK

conform to
all be stainless
steel of
Type B, Sun II,
Products Co
on all bolts

2" x 3"
as req

AIR

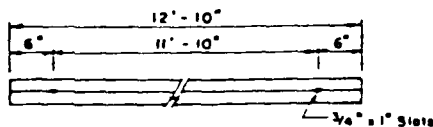


"L" BOLT
Supply with washers and Type 2 nuts.

GRATING PANEL

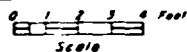


STRAP



ANGLE (A)

HIGH STAGE TRASH RACK DETAILS



QUANTITIES

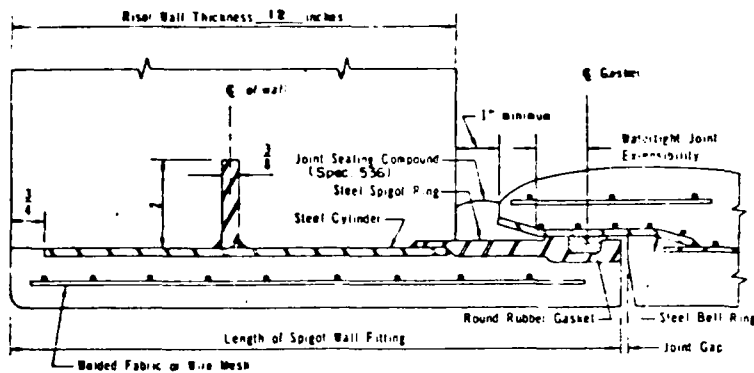
METAL FABRICATION & INSTALLATION --- LUMP SUM

HIGH STAGE TRASH RACK BILL OF MATERIALS				
ITEM	SIZE	LENGTH	QUANTITY	
Angles (A)	3/2" x 3/2" x 3/8"	12'-10"	10	
Strap	3/4" x 2" x 33"	-	4	
"L" Bolt	3/8" Dia	9" x 15"	28	
Grating Panel	33 3/4" x 12'-10"	-	2	
Pipe Sleeves	3/4" In Dia	12"	28	

ASSUNPINK CREEK WATERSHED PROJECT
MULTIPLE PURPOSE DAM NO 20
MERCER COUNTY, N.J.
HIGH STAGE TRASH RACK
AND RISER ACCESSORIES
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

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SHEET 10

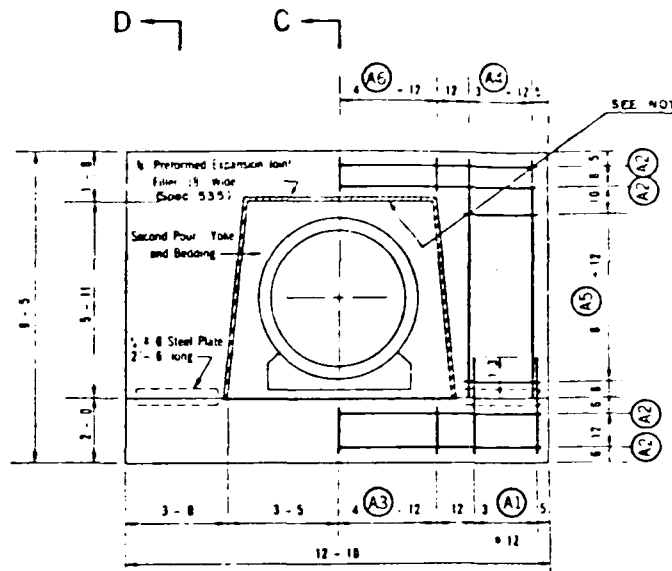


DETAIL A

NOTES

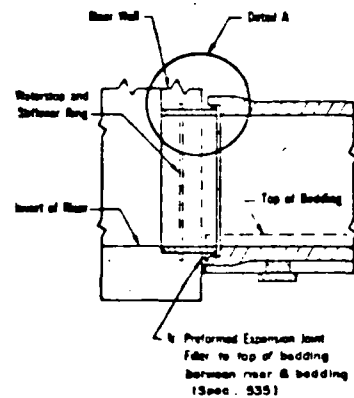
1. Sufficient sealing blocks and wedges will be provided to support the reinforced concrete pipe to the line and grade as shown on sheet 11. Fabrication and installation of support blocks are incidental to the item "48" r/c pipe. See detail, this sheet, for suggested support blocks.

2. Place 1/4" x 1'-6" x 8'-11 1/2" steel plate before first pour takes initial set. After initial set, remove steel plate and inspect for any imperfections. Any air voids shall be filled and both sides of the steel plate shall be coated with commercial grade asphalt roofing compound, steel plate then shall be carefully reset in its original position.

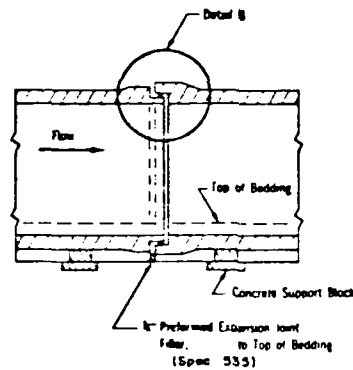


DETAIL OF ANTI-SEEP COLLAR

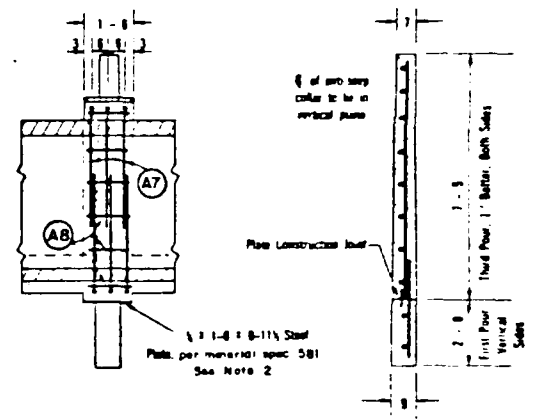
Note steel not shown



DETAIL OF SPIGOT WALL FITTING



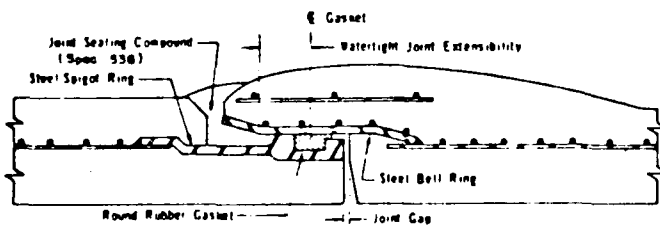
DETAIL OF PIPE JOINT



SECTION C-C

Anti-seep collar steel not shown

SECTION D-D



DETAIL B

JOINT REQUIREMENTS			
Length of Pipe Section	Minimum Joint Length	Minimum Joint Limiting Angle	
feet	inches	degrees	
2.0	2.75	0.019	1'-0.6'

For pipe length other than shown, joint requirements will be determined by the Engineer.

Where pipes of different lengths are connected, adjoining pipes shall meet the requirements of the longer pipe.

Prior to delivery of pipe, the joint detail proposed for use shall be submitted to the Engineer for approval.

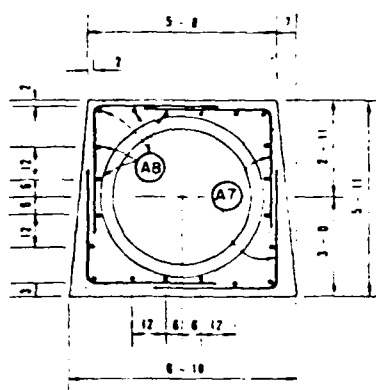
STRENGTH	
Inside Diameter of Pipe	Hydraulic Pressure
inches	feet
4.8	1.0

The outside diameter of the pipe shall be as shown. The joint detail proposed for use shall be submitted to the Engineer for approval.

STANDARD CONDUIT DETAILS	
FOR REINFORCED CONCRETE PRESSURE PIPE PRINCIPAL SPILLWAY	
STANDARD Dwg. No.	ES 5048-BE
DATE	2/70
SHEET	1 OF 1

Joint length equals watertight joint extensibility plus joint gap.

The pipe shall be drawn together so that the maximum joint gap does not exceed 1/16" (1/16" pipe laid on a straight line). For rammed pipe, the maximum joint gap at the joint shall not exceed 1/16" (1/16" pipe laid on a straight line).



DETAIL OF ANTI-SEEP COLLAR YOKE

3. Under side of preformed joint filler at top of pass shall be field coated with commercial grade asphalt roofing compound immediately before installation.
4. Material certification waived for asphalt roofing compound.
5. See Sheet 27 for Bell Well Fitting.

STEEL SCHEDULE

Anti-seep Collar and Yawl				3	Required	
Mark	Size	Quantity per Collar	Length	Type	Total Quantity	Total Length
A1	4	8	3 - 9	1	18	54-0
A2	4	4	12 - 4	1	12	148-0
A3	4	7	1 - 6	1	21	31-6
A4	4	6	7 - 2	1	18	129-0
A5	4	12	2 - 6	1	36	90-0
A6	4	7	1 - 0	1	21	21-0
A7	4	12	6 - 10	21	36	246-0
A8	4	20	1 - 2	1	80	70-0

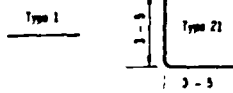
QUANTITIES

Concrete, Class 4000	17.9 Cu Yds
Auto strip Collar including Tote	
* Each	3.2
Total	9.6
Bonding	
** Per Linear Foot of Bonding	0.11
Total	0.3
Steel, reinforcing	Pounds
Auto strip Collar including Tote	52.7
48" dia reinforced concrete pressure pipe	80 LF

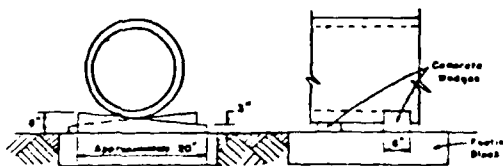
Concrete quantities are based on an outside diameter of pipe of 36 inches.
Steel quantities do not change with outside diameter of pipe.

- Then quantity is given by
 $3\ 131 - 0.004330 (0_1 - 50) (0_1 - 50)$ cu yds
 - Then quantity is given by
 $0\ 1877 - 0.0006 (0_1 - 50)$ cu yds
- 0_1 = outside diameter of pipe furnished inches

D_1 = outside diameter of pipe furnished inches



BAR TYPES



(NOT TO SCALE)

SUGGESTED SUPPORT METHOD
FOR R/C PIPE

PRECAST CLASS 4000 CONCRETE REQUIRED:

STRENGTH REQUIREMENTS			
Inside Diameter of Pipe	Internal Load	External Load	
	Hydrostatic Pressure	Minimum 3 Edge Bearing Strength in Pounds per Lineal Foot on Pipe	
		Applicable Standard Specification	
		AASHTO C-301	AASHTO C-300
Head of Water	Load to produce 0.001 inch crack one foot long	Load to produce 0.01 inch crack one foot long	
inches	feet		
40	13	3200	

The outside diameter of pipe assumed in design is 55.8 inches where the pipe furnished has an outside diameter greater than assumed in design. The three edge bearing strength of the pipe furnished must not be less than the three edge bearing strength required by the use of the outside diameter of the pipe furnished to the outside diameter assumed in design.

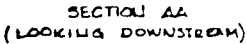
ASSUNPINK CREEK WATERSHED PROJECT
MULTIPLE PURPOSE DAM NO 20
MERCER COUNTY, N.J.

CONDUIT DETAILS

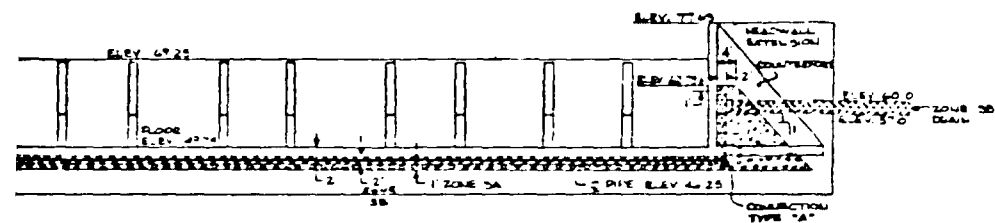
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Date: <u>6/16</u> Time: <u>1:15 PM</u> Location: <u>Lee & Wolf</u> Case No: <u>3-75</u>	Page: <u>16</u> Date: <u>6/1</u> NJ-08 2010-20
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SHEET 11

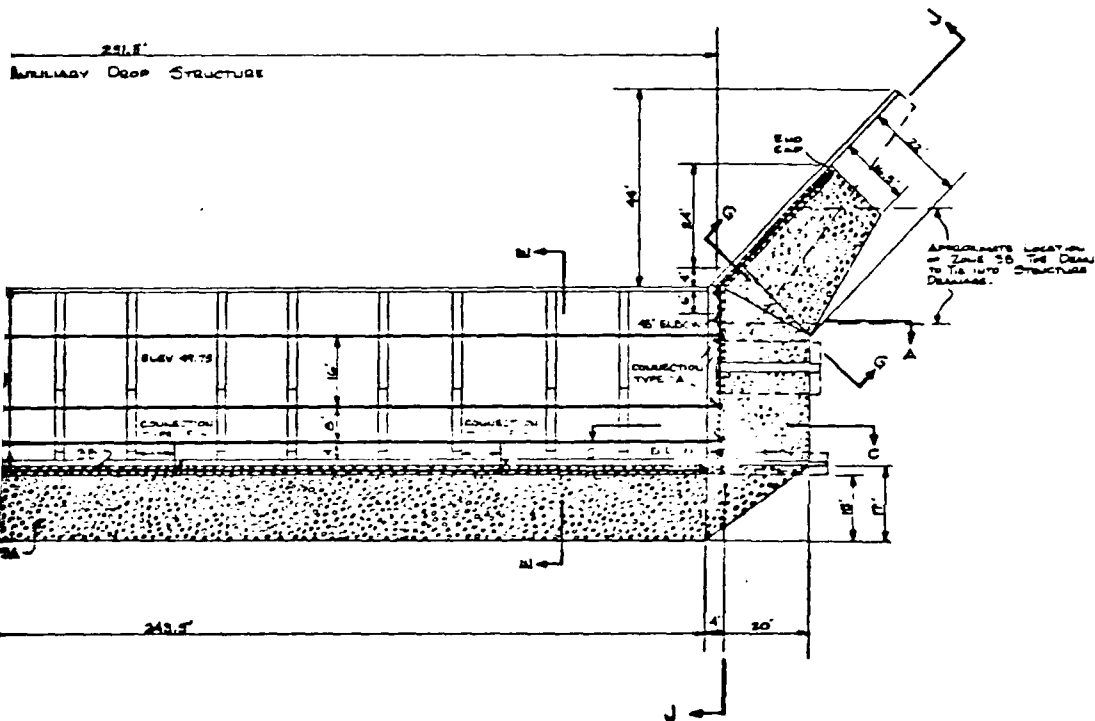


- MOVIES:
1. From Dusk Till Dawn
 2. 6" Underneath
All Day &
Concerts.
 3. The Sherry
 4. The House of
the Dead



NH)

241.8'
BUTTERFLY DROP STRUCTURE



OF PIPE AND DRAIN FILL

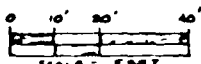
QUANTITIES

6 INCH RVC 1800 FT. 11.13

11,1670 FT. 2 PERFORATED
11,190 FT. 2 NON-PERFORATED

NOTES:

1. SEE DETAILS OF CONSTRUCTION TYPES, SEE SHEET 11.
2. 6" DUCTILE PVC PIPE SHOWN AS A MEAN LINE. ALL PIPE IS PERFORATED EXCEPT SECTIONS SHOWN IN CONCRETE. SEE COMMENTS ON SHEET 11.
3. SEE SHEET 11 FOR SECTIONS DB, CC, DD, EE, HH, AND II.
4. BEFORE PLACING CONCRETE ON MINIMUM 1" RAIN PILL SURFACES PLACE ONE LAYER OF POLYETHYLENE SHEETING, 6 MILS THICK.



SCHEDULE OF 6" IPGW FITTINGS REQUESTED

TYPE	QUANTITY
END CAP	18
90° ELBOW (ALL BELL)	7
90° ELBOW (BELL / SHOOT)	19
45° ELBOW (ALL BELL)	3
ALL BELL TEE	19

ASSUNPINK CREEK WATERSHED PROJECT
MULTIPLE PURPOSE DAM NO. 20
WEST WINDSOR TWP, MERCER CO., N.J.
STRUCTURE DRAINAGE DETAILS

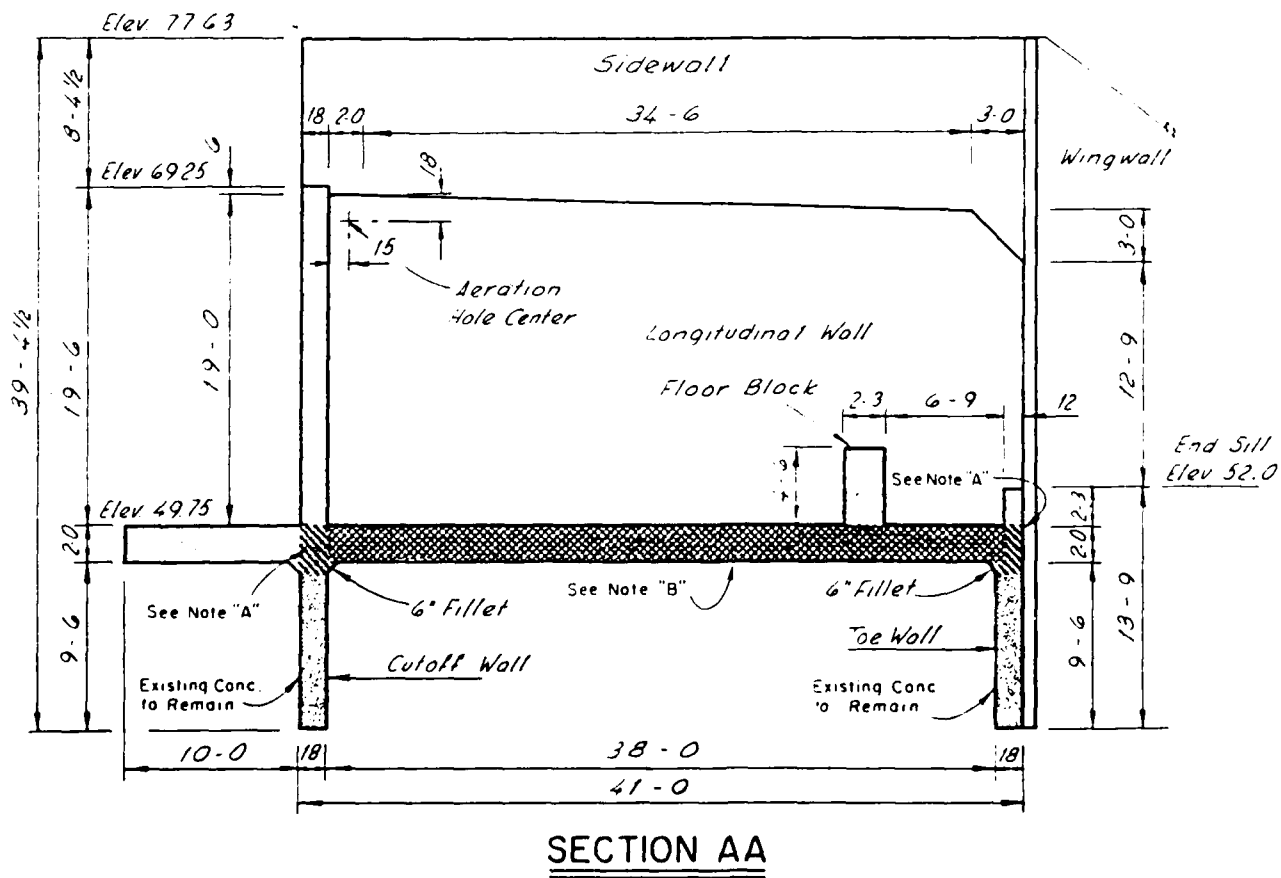
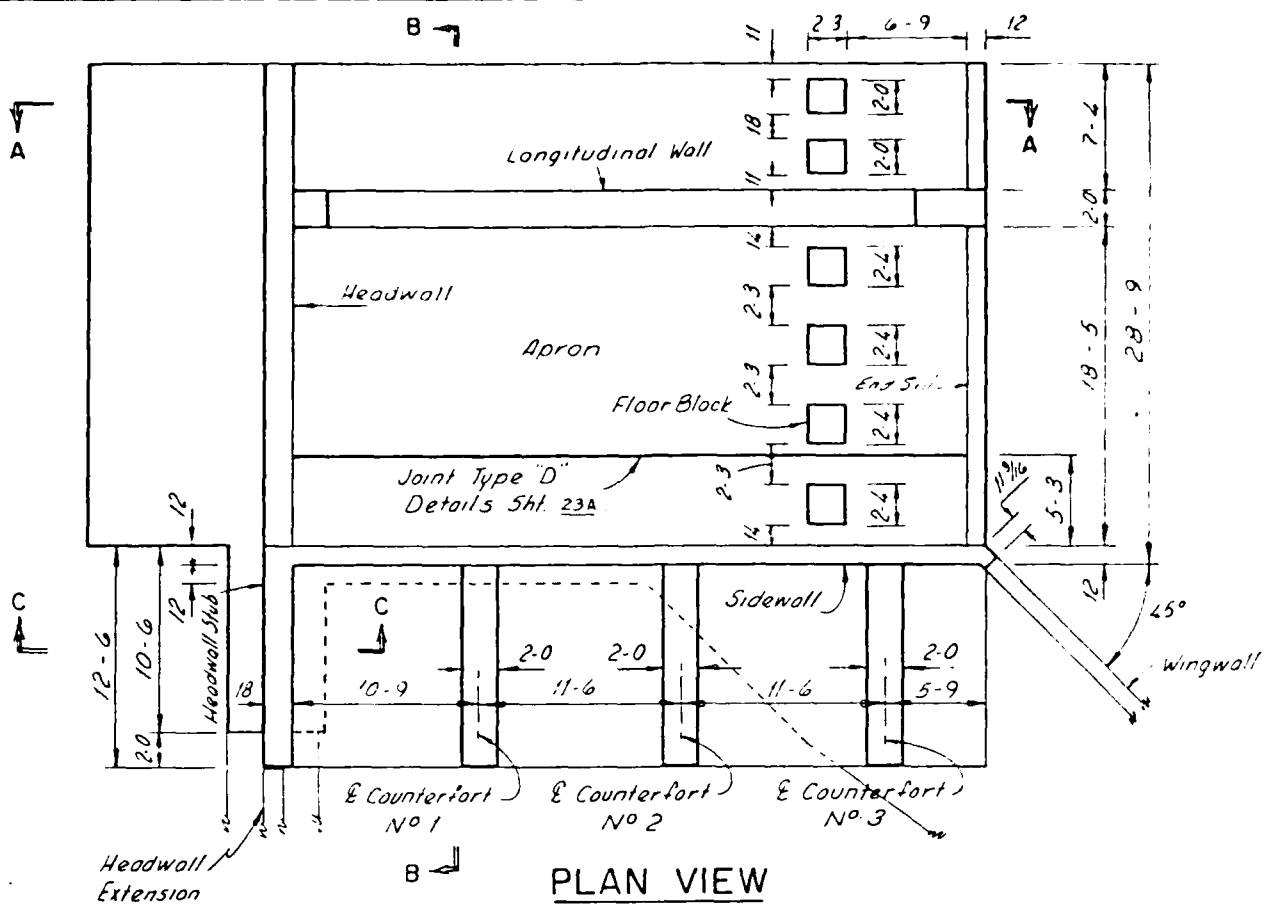
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Project: J. J. HIRSCHER ...	9/74	Approved by: ...
Drawn: J. & G. BORD ...	9/74	Check: ...
Field:
Project: L. & M. ...	2/17	NJ-08-2010-20

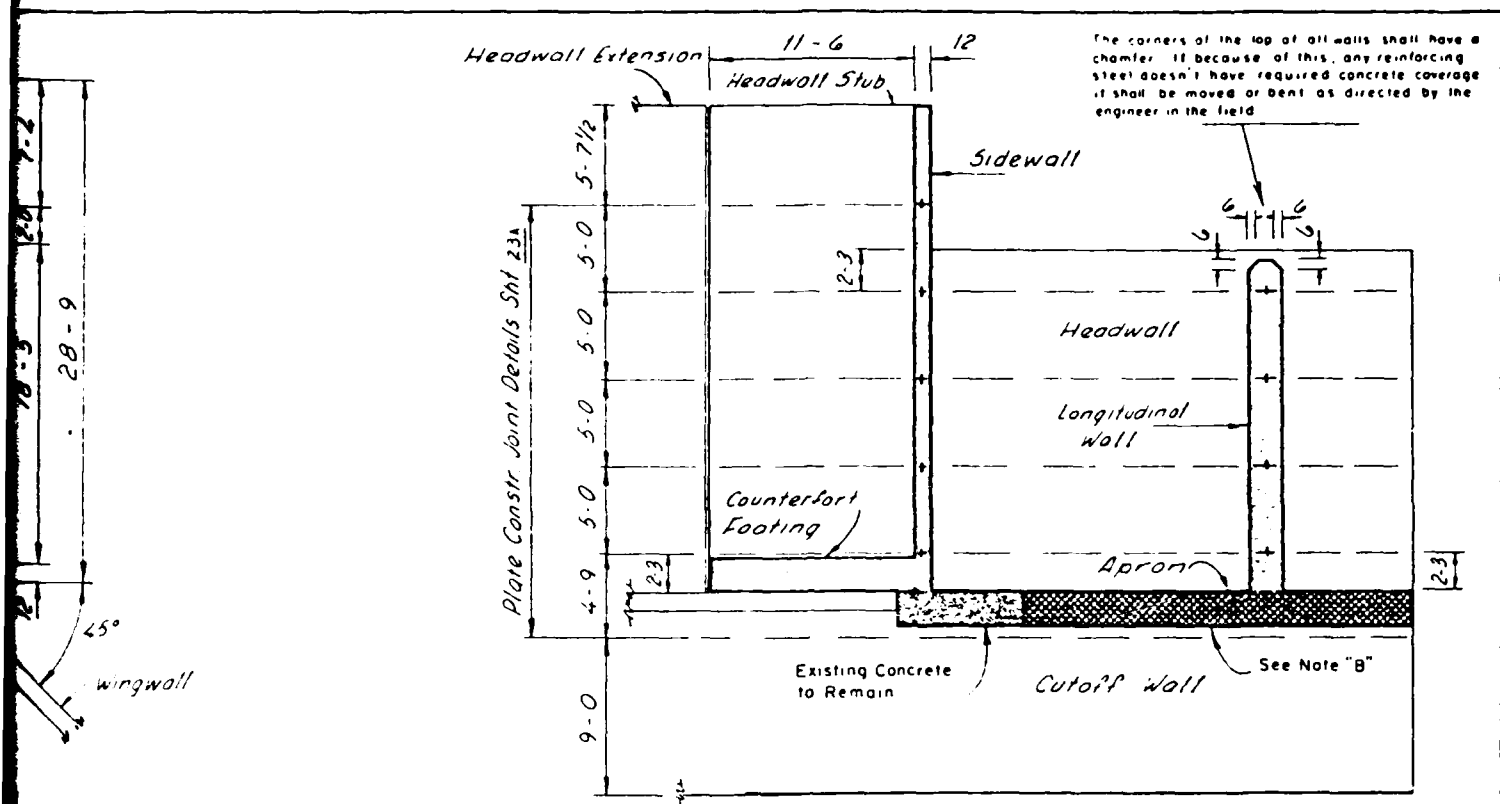
SHEET 12

KCS-31319-64

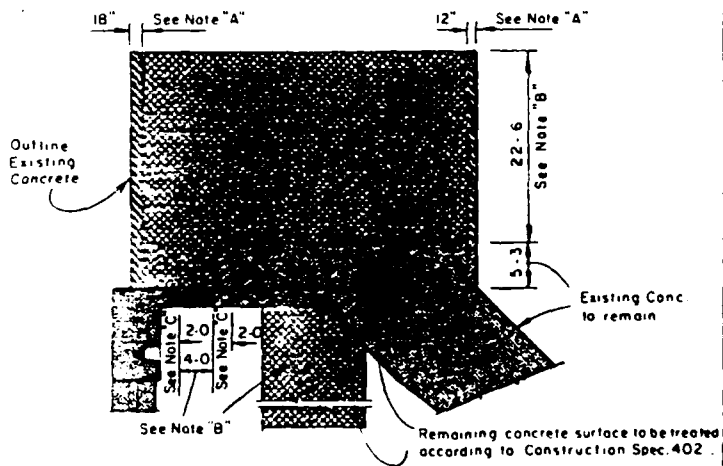
12



SEC



SECTION BB



REMOVAL OF PORTIONS OF EXISTING APRON NOTES

- "A" When removing the existing concrete in this section the vertical steel extending from the cutoff and toe walls shall not be cut or damaged.
- "B" In this area all existing concrete and steel to be removed and wasted.
- "C" When removing existing concrete in this area care must be taken not to cut or damage longitudinal steel. Transverse steel will be removed and wasted.

Drop Spillway "F"

ASSUNPINK CREEK WATERSHED PROJECT
MULTIPLE PURPOSE DAM NO 20
MERCER COUNTY, N.J.
STRUCTURAL DETAILS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Date	Designed	Drawn	Checked	Approved
Feb 78	RL	MTB	BT	B
REVISION				

Designed: _____ Date: _____

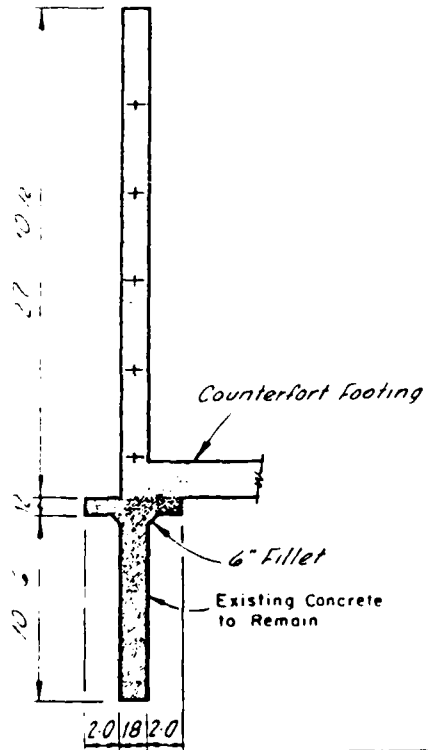
Drawn: *H.J. Brown* Date: _____

Checked: _____ Date: _____

Approved: _____ Date: _____

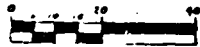
Sheet: *31A* Drawing No: *NJ-08-2010-20*

SECTION CC



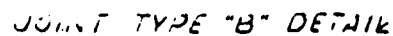
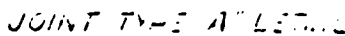
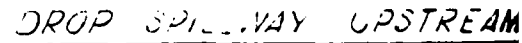
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SCALE



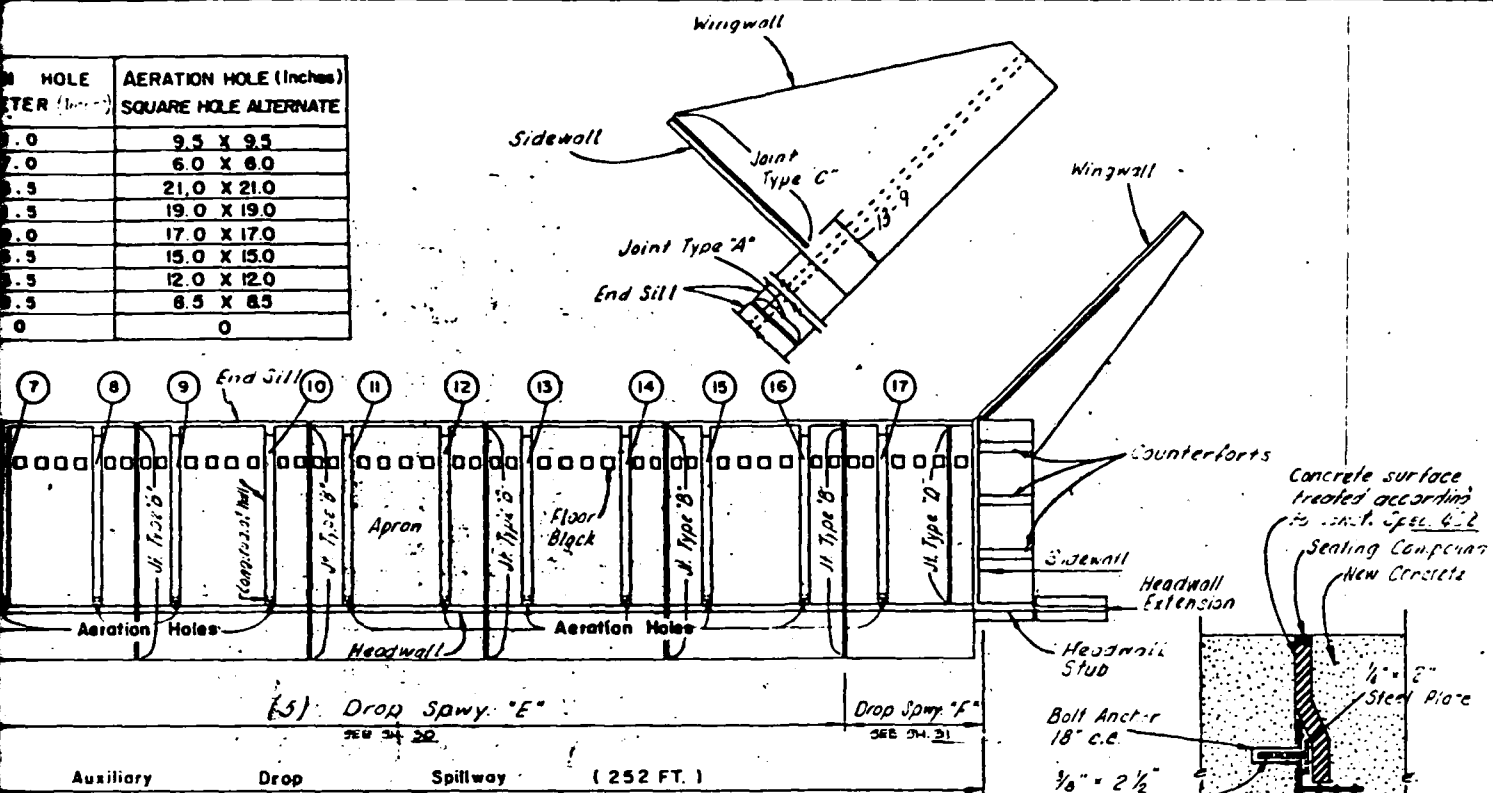


<i>Feb. 18</i>				
Date	Designed	Drawn	Checked	Approved
REVISION				

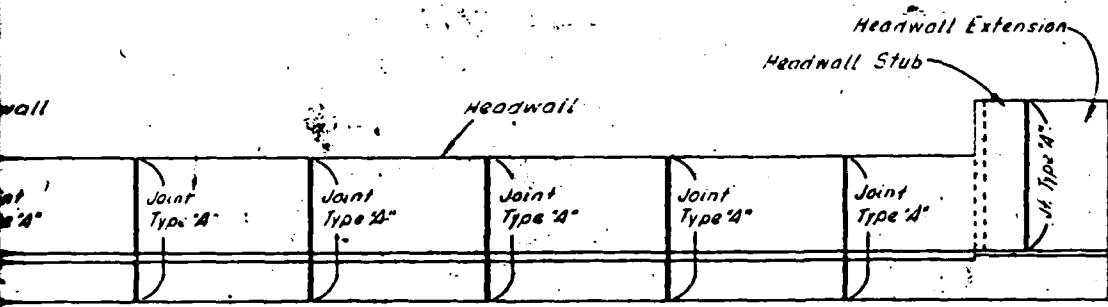
Designed	LEN BECK	8-74	Approved by	
Drawn	H.T. BROWNING JR.	8-74	Title	
Traced			Sheet	
Checked	LEE A. HUNT	8-74	Drawing No.	NJ-08-2010-20

[illegible]

HOLE ETER (Inches)	AERATION HOLE (Inches) SQUARE HOLE ALTERNATE
1.0	9.5 X 9.5
2.0	6.0 X 6.0
3.5	21.0 X 21.0
4.5	19.0 X 19.0
6.0	17.0 X 17.0
8.5	15.0 X 15.0
1.5	12.0 X 12.0
3.5	8.5 X 8.5
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DROP SPILLWAY PLAN



SPILLWAY UPSTREAM ELEVATION

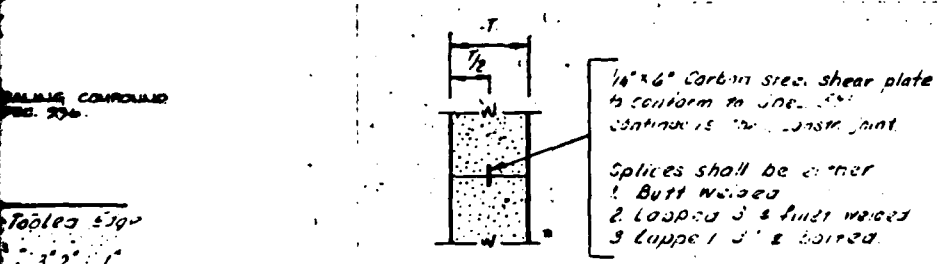
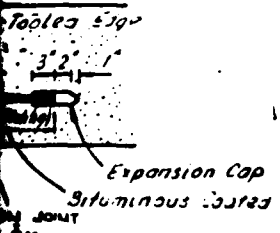
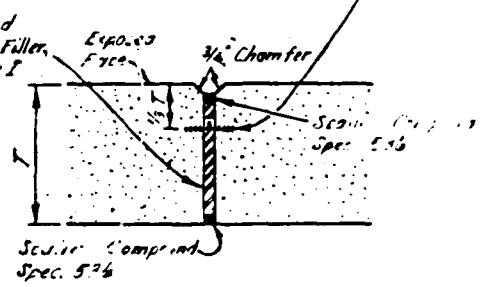


PLATE CONSTR. JOINT DETAILS

NOT TO SCALE

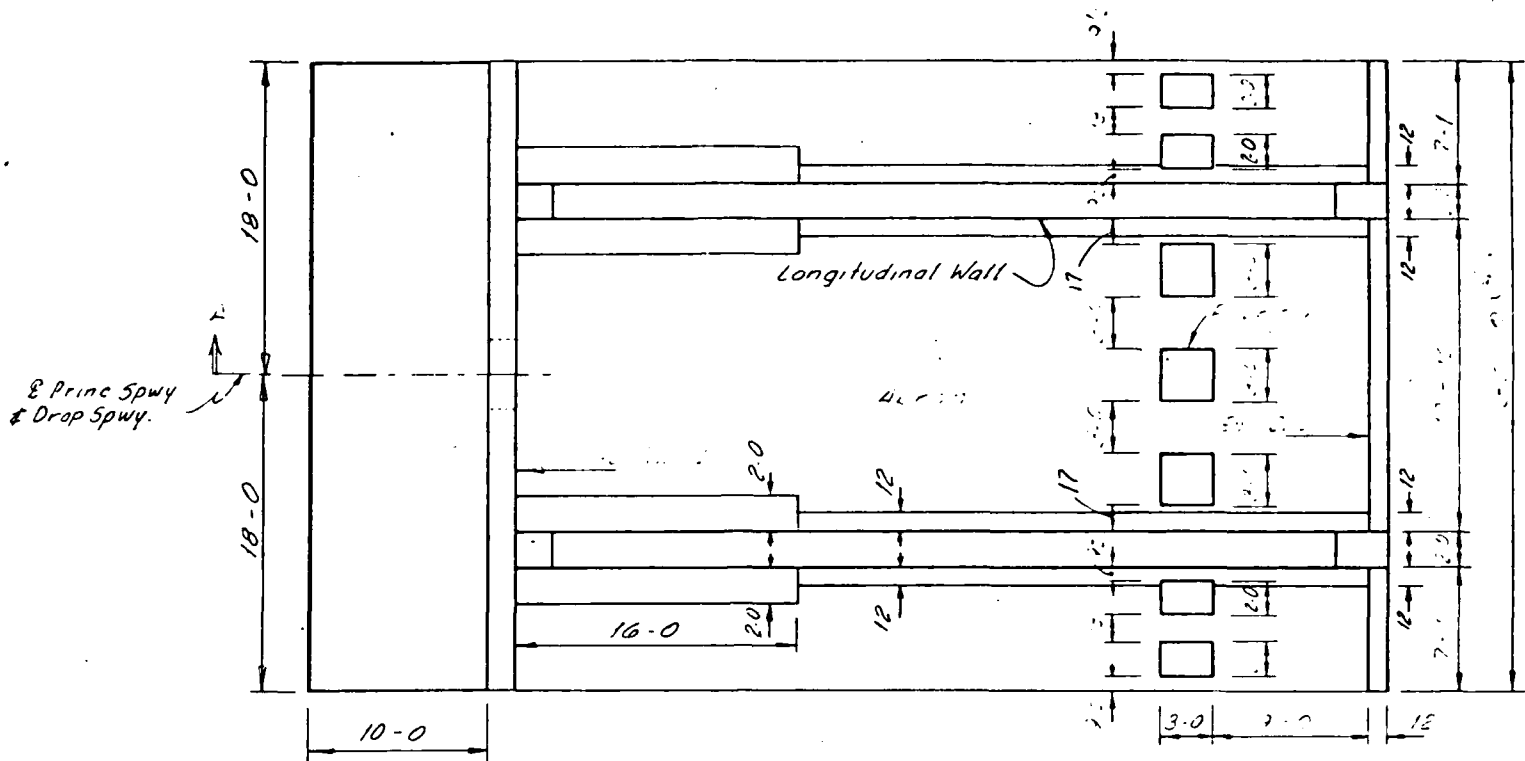


EXPANSION CAP DETAIL

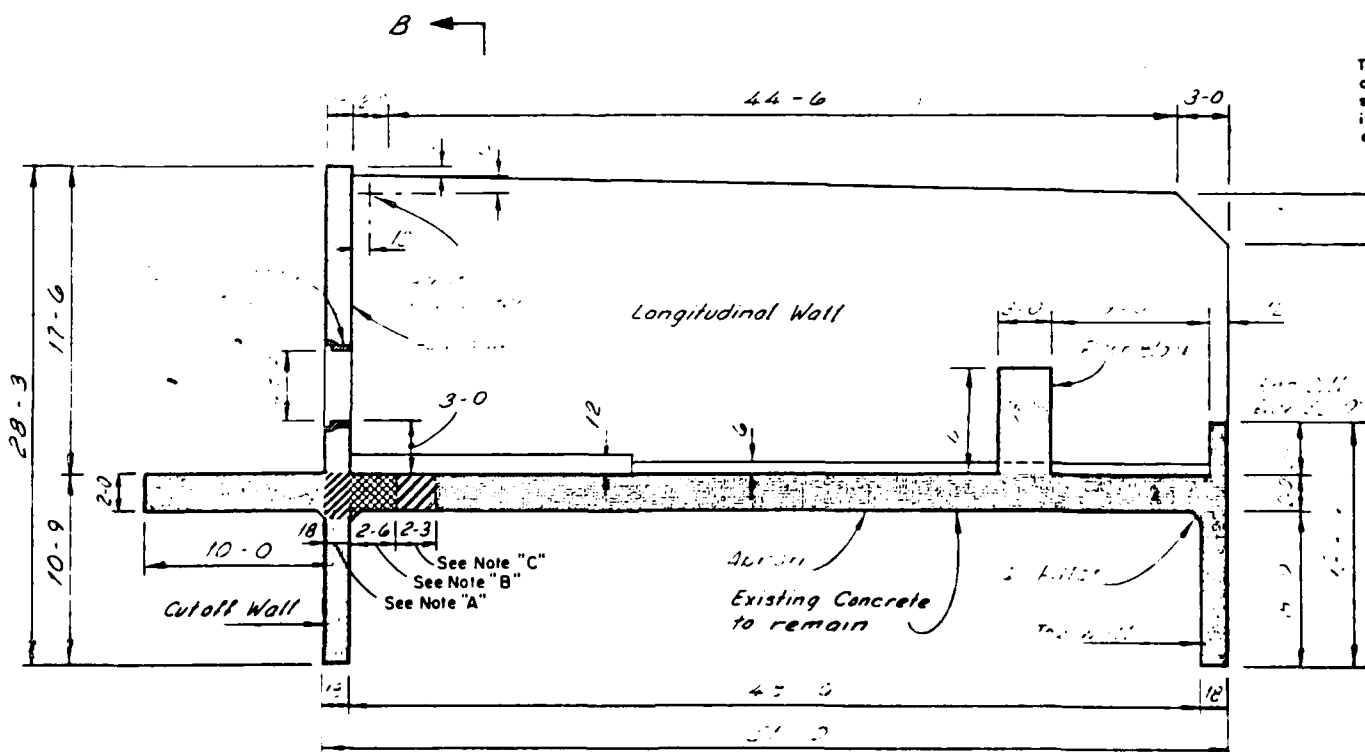


JOINT TYPE C DETAIL

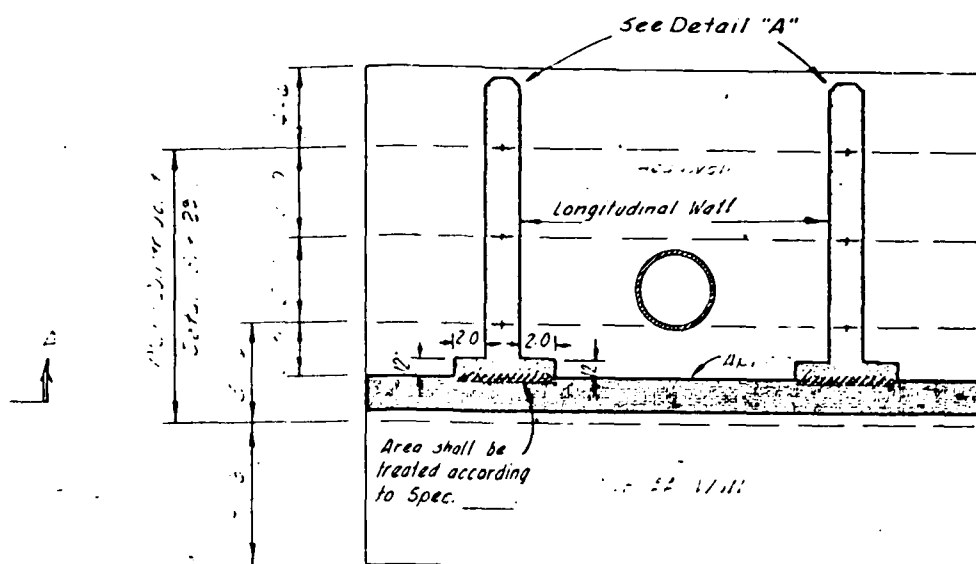
ASSUNPINK CREEK WATERSHED PROJECT MULTIPLE PURPOSE DAM NO. 20 MERCER COUNTY, N.J.				
ARTICULATE JOINT DETAILS & LOCATION				
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE				
Designed by <i>John A. B...</i>	Date Feb 78	Approved by <i>H. B. ...</i>	Date 1/17/78	Project No. NJ-08-2010-20
Drawn by <i>John A. B...</i>	Date 1/17/78	Checked by <i>John A. B...</i>	Date 1/17/78	
REVISION				



PLAN VIEW



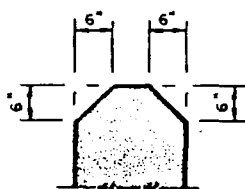
SECTION A-A



SECTION 5.5

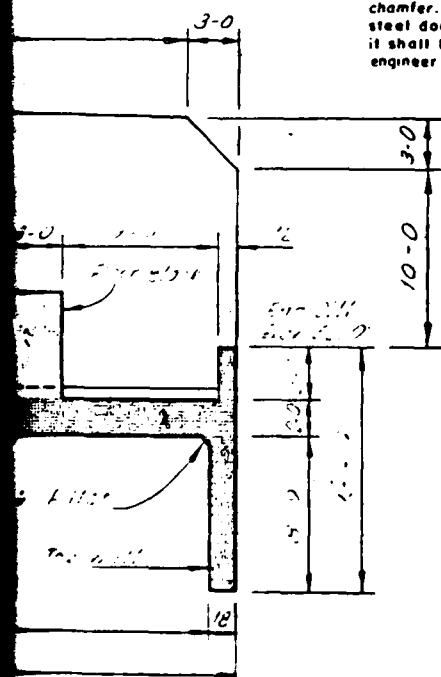
[illegible]

~~APPLY JOINT SEALING COMPOUND AS SHOWN IN
DETAIL B, SHEET~~



DETAIL "A"

The corners of the top of all walls shall have a chamfer. If, because of this, any reinforcing steel doesn't have required concrete coverage it shall be moved or bent as directed by the engineer in the field.

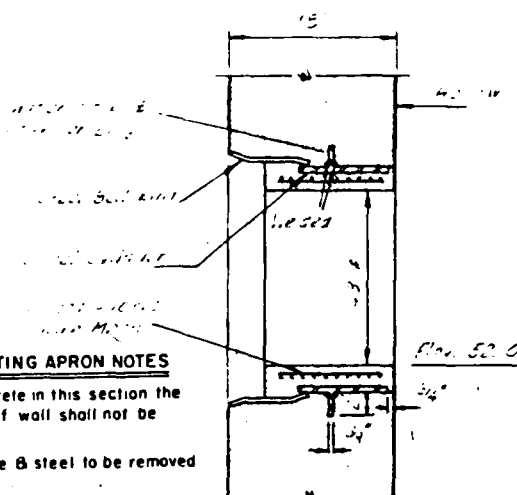


REMOVAL OF PORTIONS OF EXISTING APRON NOTES

"A" When removing the existing concrete in this section the vertical steel extending from the cutoff wall shall not be cut or damaged.

"B" In this area all existing concrete & steel to be removed & wasted.

"C" When removing existing concrete in this area care must be taken not to cut or damage longitudinal steel. Transverse steel will be removed & wasted. L



F. E. ... AT ...

1920

~~FOR STEEL DETAILS, SEE~~
~~SHEETS AND~~

0 2 4 6 8 10

813

Scale

Drop Spillway "B"

ASSUNPINK CREEK WATERSHED PROJECT
MULTIPLE PURPOSE DAM NO 20
MERCER COUNTY, N.J.

STRUCTURAL DETAILS

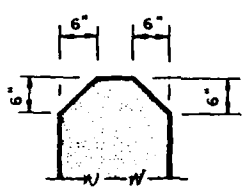
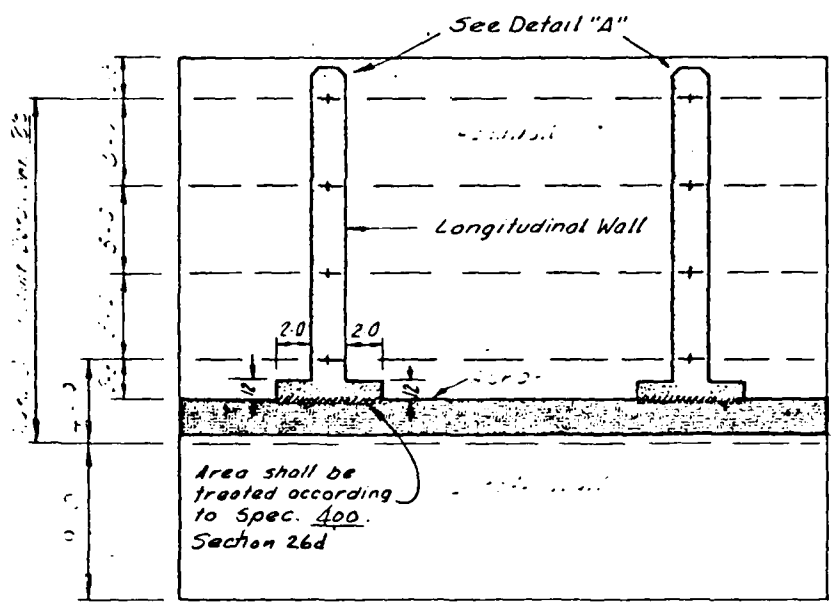
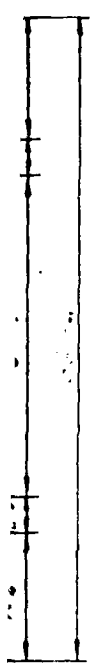
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

2/10	B	HTB	B	
9/77	XB	HTB	M.C.	
Date	Designed	Drawn	Checked	Approved

REVISION

Date _____
Approved By _____
Date _____
Origin HI 5700-6724 46974
Traced _____
From Book 47A

NJ-08-2010-20

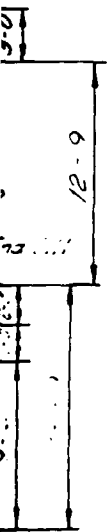


DETAIL "A"

The corners of the top of all walls shall have a chamfer. If, because of this, any reinforcing steel doesn't have required concrete coverage it shall be moved or bent as directed by the engineer in the field.

REMOVAL OF PORTIONS OF EXISTING APRON NOTES

- "A" When removing the existing concrete in this section the vertical steel extending from the cutoff wall shall not be cut or damaged.
- "B" In this area all existing concrete & steel to be removed & wasted.
- "C" When removing existing concrete in this area care must be taken not to cut or damage longitudinal steel. Transverse steel will be removed & wasted.



0 2 4 6 Ft

 Scale

FOR STEEL DETAILS, SEE SHEETS 45 AND 46.

Drop Spillway "D"

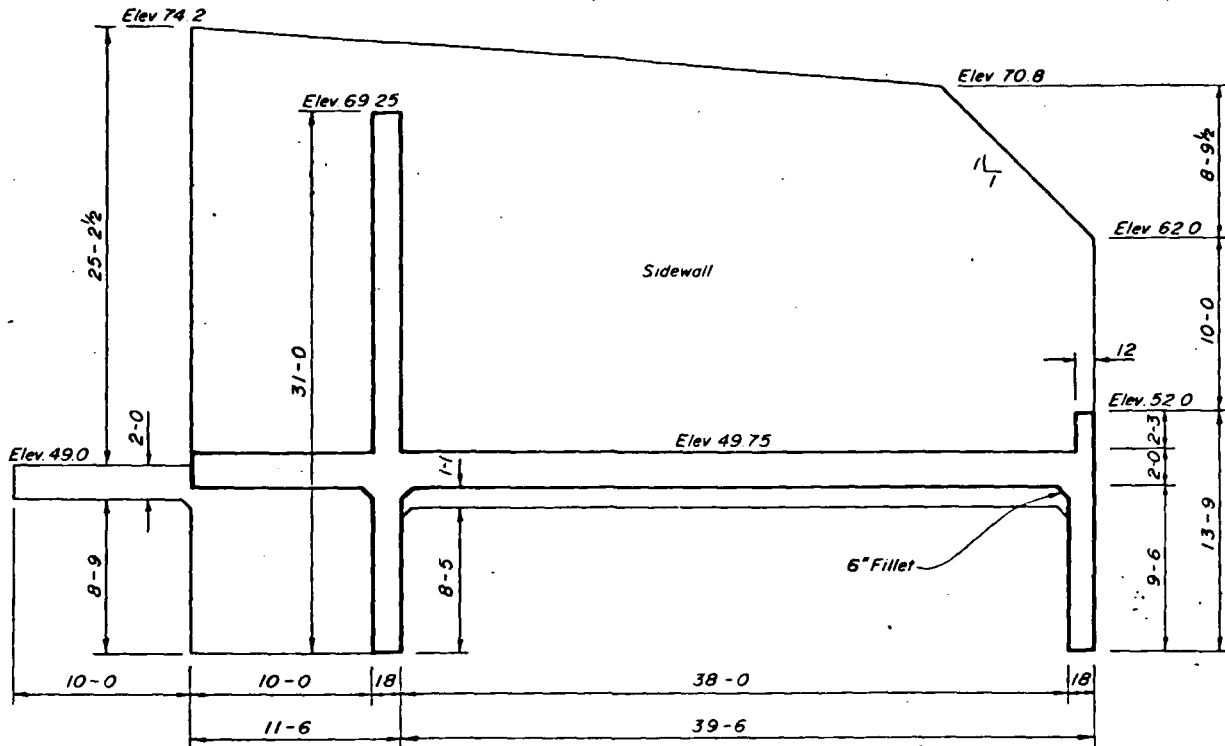
ASSUNPINK CREEK WATERSHED PROJECT MULTIPLE PURPOSE DAM NO 20 MERCER COUNTY, N.J.	
STRUCTURAL DETAILS	
U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE	
Designed by <i>Sublet</i>	Checked by <i>Sublet</i>
Drawn by <i>H. B. Greening</i>	Approved by <i>Sublet</i>
Date	Project No. NJ-08-2010-20

DATE	DESIGNED	DRAWN	CHECKED	APPROVED
2/78	SB	MB	PI	B
9/77	SO	H+B	Sublet	

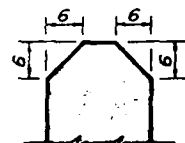
REVISION

SHEET 1A

12

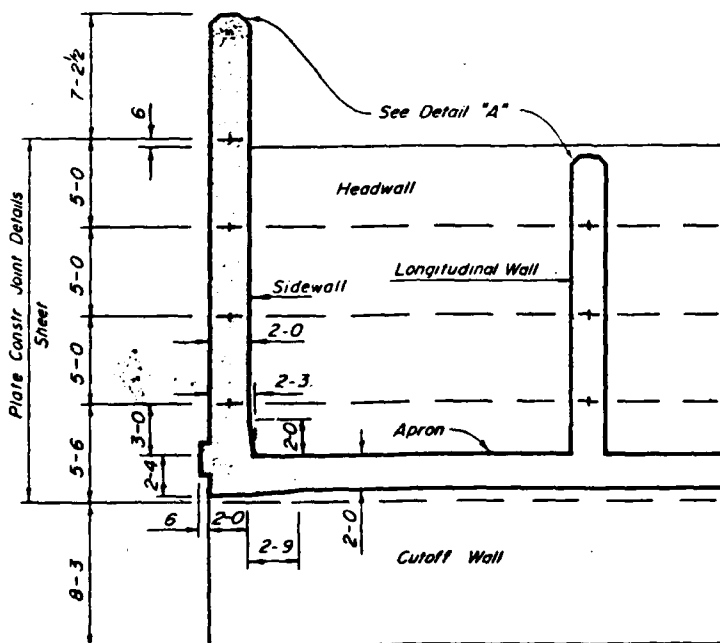


SIDEWALL ELEVATION



DETAIL "A"

The corners of the top of all walls shall have a chamfer if, because of this, any reinforcing steel doesn't have required concrete coverage it shall be moved or bent as directed by the engineer in the field.



SECTION B B

Plate Constr. Joint Location

FOR STEEL DETAILS, SEE SHEETS 42A

Drop Spillway "C"

ASSUNPINK CREEK WATERSHED PROJECT
MULTIPLE PURPOSE DAM NO 20
MERCER COUNTY, N.J.
STRUCTURAL DETAILS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

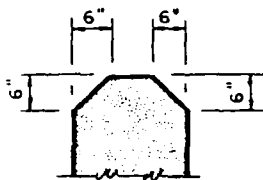
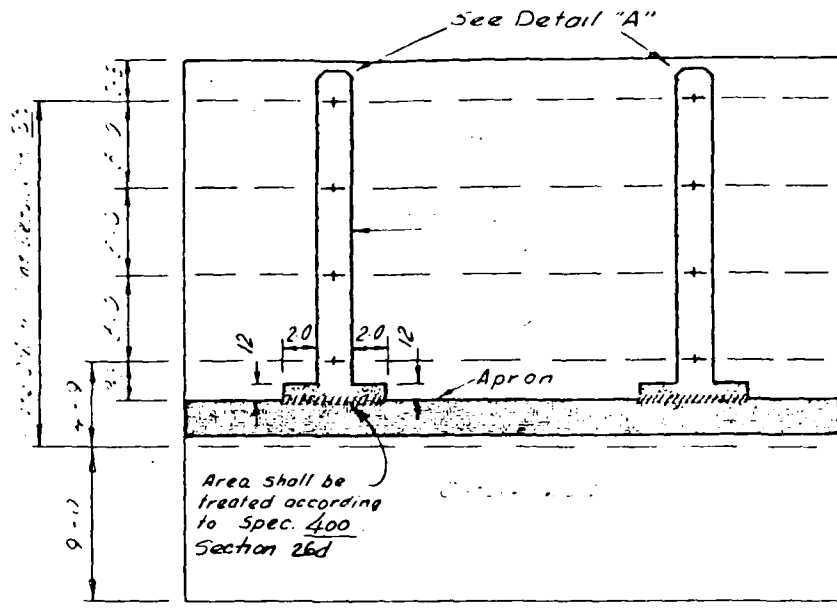
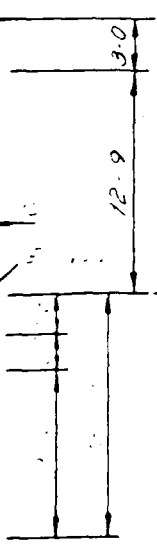
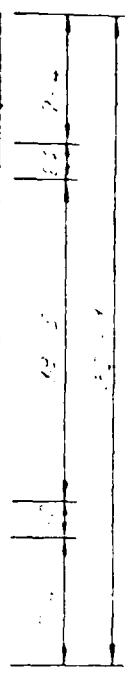
Designed	Date	Approved By
Drawn	1/98	1/98
Traced		
Checked		
Sheet		Drawing No.
24A		NJ-08-2010-20

REVISION

Feb '78	W. S.	A.R.	(S)	W. S.
Date	Designed	Drawn	Checked	Approved

0 2 4 6
Scale - Feet

SHEET 19

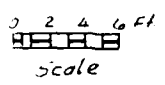


DETAIL "A"

The corners of the tops of all walls shall have a chamfer. If, because of this, any reinforcing steel doesn't have required concrete coverage it shall be moved or bent as directed by the engineer in the field.

REMOVAL OF PORTIONS OF EXISTING APRON NOTES

- "A" When removing the existing concrete in this section the vertical steel extending from the cutoff wall shall not be cut or damaged.
- "B" In this area all existing concrete & steel to be removed & wasted.
- "C" When removing existing concrete in this area care must be taken not to cut or damage longitudinal steel. Transverse steel will be removed & wasted.



FOR STEEL DETAILS, SEE
SHEETS 47 AND 48

Drop Spillway "E"

ASSUNPINK CREEK WATERSHED PROJECT	
MULTIPLE PURPOSE DAM NO 20	
MERCER COUNTY, N.J.	
STRUCTURAL DETAILS	
U. S. DEPARTMENT OF AGRICULTURE	
SOIL CONSERVATION SERVICE	
Design: <i>For Steel</i>	Date: 6/74
Drawn: <i>For Steel</i>	Checked: <i>For Steel</i>
Approved: <i>For Steel</i>	Approved: <i>For Steel</i>
Project: <i>For Steel</i>	Sheet: 304
NJ-08-2010-20	

2/78	JB	HHB	BE	JB
9/77	JB	HHB	HHB	HHB
Date	Designed	Drawn	Checked	Approved

REVISION

APPENDIX

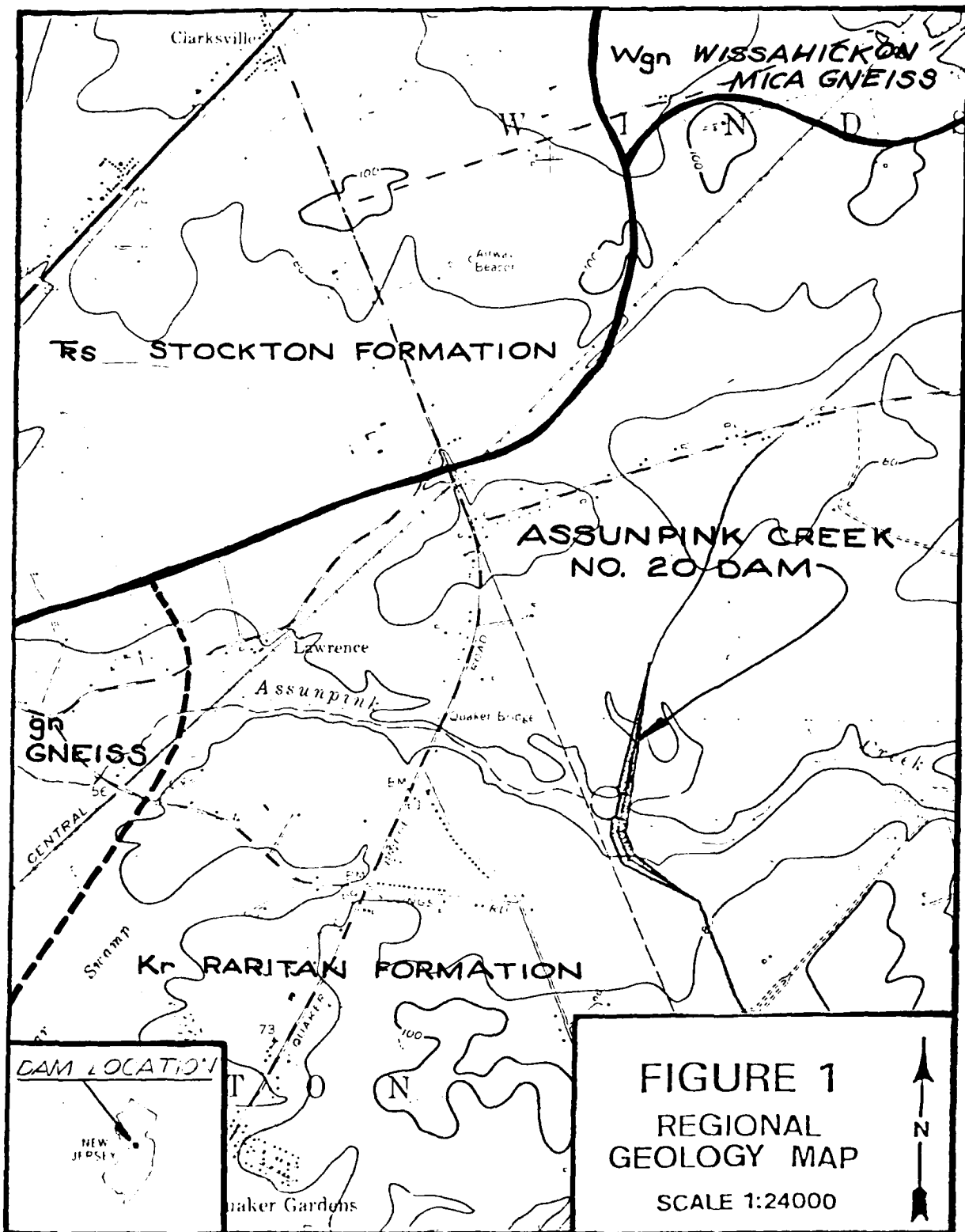
F

Site Geology

SITE GEOLOGY

ASSUNPINK CREEK DAM NO. 20

Assunpink Creek Dam No. 20 is situated in Mercer County within the northwest extremities of the Atlantic Coastal Plain physiographic province. The project rests on transitional and non-marine sediments of Cretaceous age and are represented by the Magothy and Paritan formations. For this report, these units may be considered as one unit. The sediments strike N.65°E., dip gradually southeastward and range in character from black, lignitic clays and sugary, white beach sands to principally gray, white and red sands and clays. The latter occur chiefly in the older Paritan formation and represent continental type accumulations of sediment derived from erosion of the early Paleozoic bedrock during Cretaceous time. Bedrock lies perhaps 60'-100' below ground surface and may occur in a highly weathered condition (saprolite) and is probably a remnant of land surface and tropical environment existing during Cretaceous time.



EN
DATE
ILME